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NOVEMBER, 1939

FACTORY

MANAGEMENT and MAINTENANCE

A McGRAW-HILL PUBLICATION

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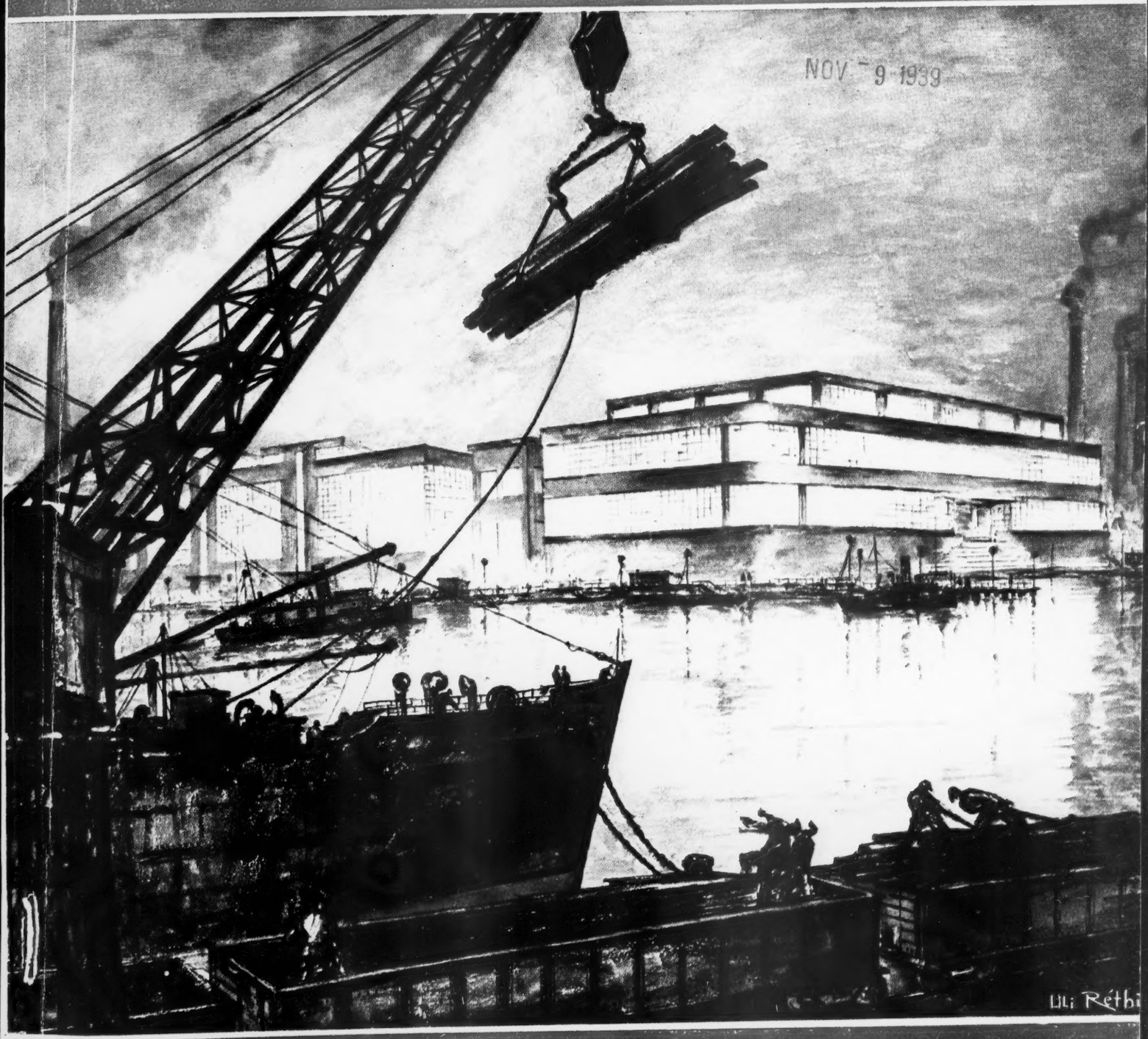


This Entire Issue **QUICK WAYS TO PROFITS**

143.562

AT

EBERHARD FABER PENCIL COMPANY

THESE **30 YEAR** VETERANS
RECORD A TIP FOR MAINTENANCE MEN

BYERS WROUGHT IRON

One of the major problems of the maintenance engineer is selecting materials of maximum economy for corrosive service. At Eberhard Faber—a famous name in pencils—maintenance men find the answer right in the plant. One illustration above shows the front of two boiler shells, with steam supply, boiler feed, and fire sprinkler lines. Shells and piping are all wrought iron, and have served continuously for 30 years.

The other illustration shows a boiler feed water tank. It and the piping are also wrought iron . . . and also thirty year veterans. Not illustrated are two stacks, with wrought iron bottom sections still on the job after 30 years. In addition to these services, the company uses wrought iron for steam returns, heat exchanger tubes, and hot and cold water lines. Selection of wrought iron for the hot and cold water line was made as a result of comparative service tests.

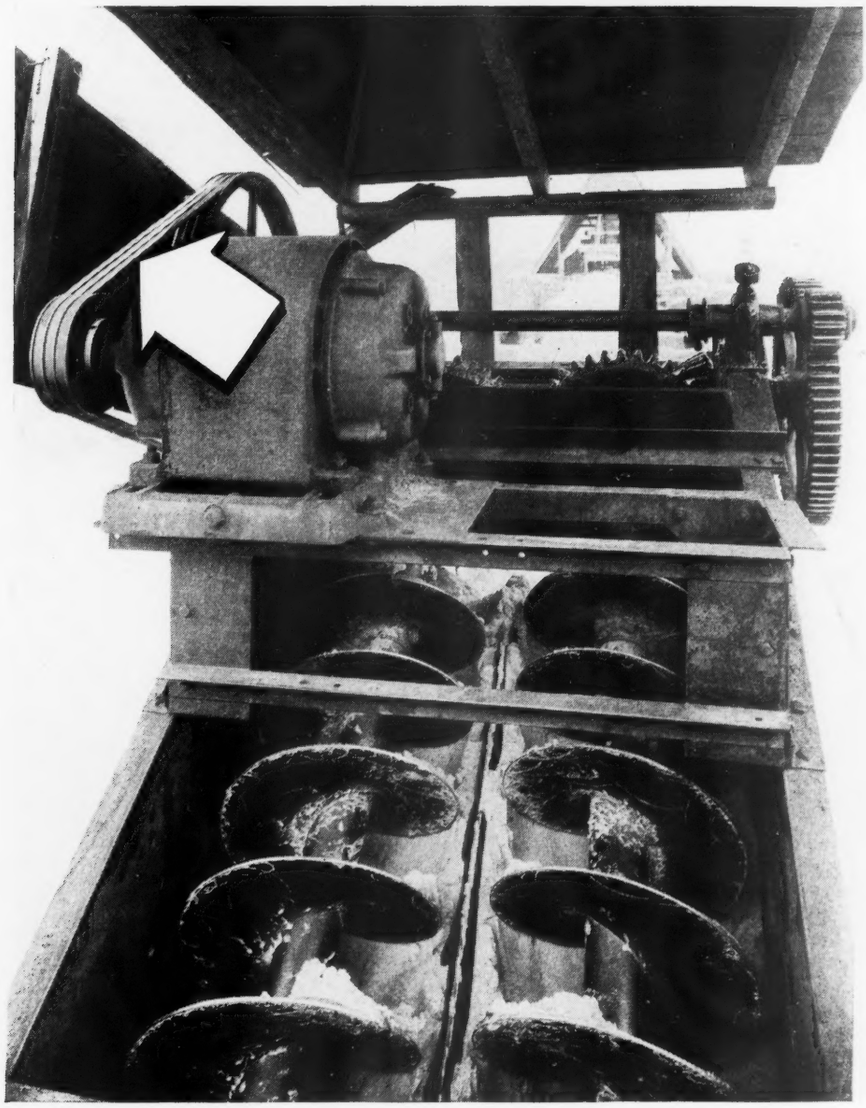
If you have a problem of material selection and want to avoid costly experimentation, just write, outlining the details. Our Engineering Service Department will (1) Determine the exact type of corrosive condition involved; (2) Check on duplicate or parallel conditions encountered in past service and recorded in our files; (3) Interpret the findings in terms of 75 years experience with corrosion problems; and (4) Make recommendations . . . supported by service records. Ask, too, for a complimentary copy of our bulletin, "Wrought Iron in Piping Systems."

A. M. Byers Co., Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Chicago, St. Louis, Houston, Seattle. San Francisco.

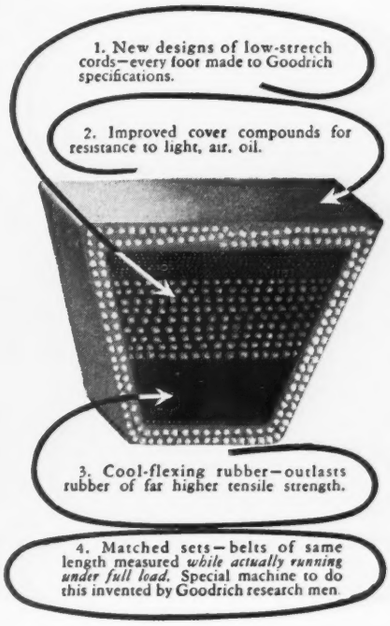
BYERS GENUINE WROUGHT IRON

TUBULAR AND FLAT ROLLED PRODUCTS

Specify Byers Genuine Wrought Iron Pipe for corrosive services and Byers Steel Pipe for your other requirements



Recent Improvements in Goodrich V-Belts


1. New designs of low-stretch cords—every foot made to Goodrich specifications.
2. Improved cover compounds for resistance to light, air, oil.
3. Cool-flexing rubber—outlasts rubber of far higher tensile strength.
4. Matched sets—belts of same length measured *while actually running under full load.* Special machine to do this invented by Goodrich research men.

Goodrich V-Belts on brute drive 7 years and show no sign of wear

EXPOSED to air and weather, called on to carry overloads of 200% frequently, these Goodrich V-Belts have been driving a heavy double screw conveyor for 7 years and show not a sign of wear. They are good for years more of trouble-free service.

Goodrich anti-stretch cords take up the shock and strain of overloads that would ruin many belts. Goodrich rubber-and-fabric covers protect the belt against oxidation and dust. And perhaps the two chief reasons why Goodrich V-Belts set records for long life and low cost are these two important Goodrich values:

1—Goodrich Belts Run 75% Cooler

Here you see a Goodrich engineer "taking the temperature" of a V-Belt in use. Goodrich spent years in research, finally developed a special rubber which runs 75% cooler than old compounds and so reduces the internal heat which destroys belts.

2—Belt Sets Matched Under Tension

Every Goodrich V-Belt is measured under operating tension, and you can get sets made of belts of equal length. In such sets, each belt pulls its full share of the load—there are no sagging belts to slip and wear. A Goodrich matched set wears evenly, lasts longer, reduces belt cost.

Get full benefit of V-Belt economy

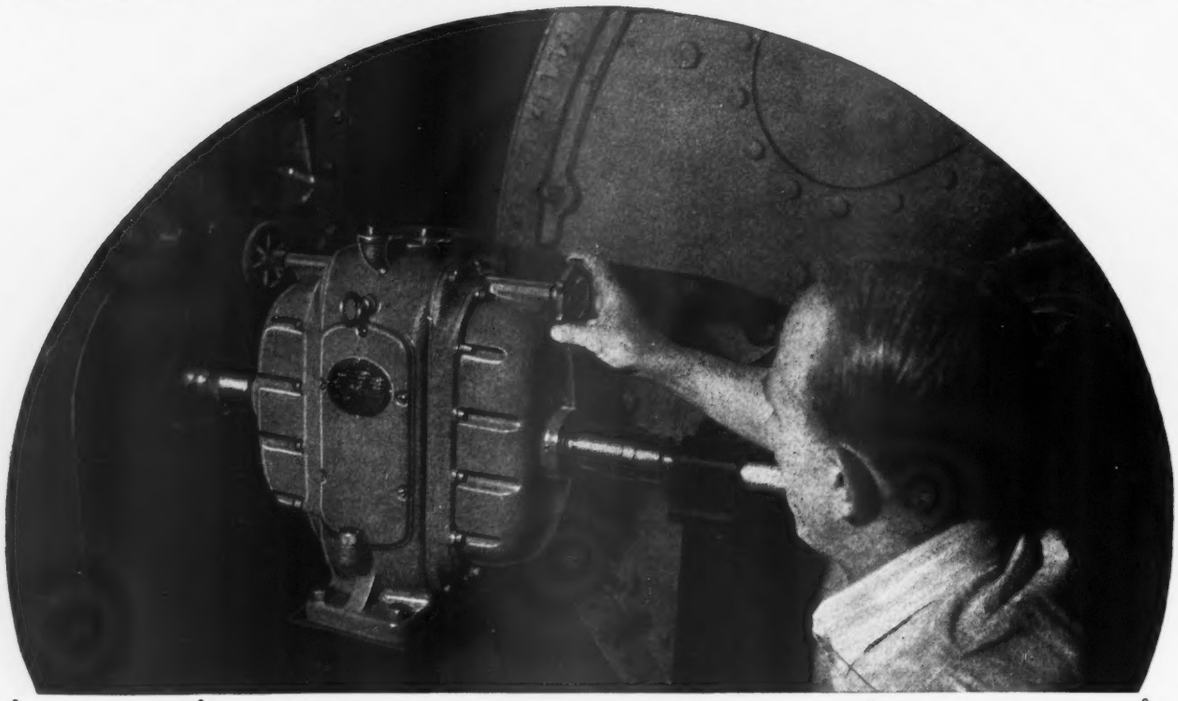
V-Belts can be the most economical method of power transmission for thousands of drives. Get the full economy V-Belts can give you—specify the V-Belts with protective cover, low-stretch cords, anti-oxidizing, cool-running rubber—Goodrich V-Belts . . . and get them in matched sets for maximum life. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

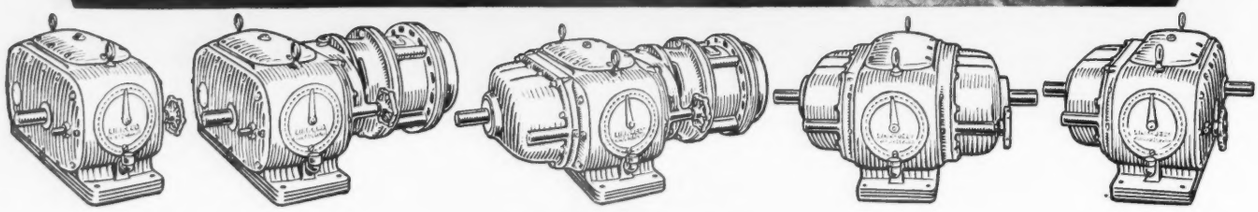
Goodrich

cool-running, tension-matched

V-Belts

POSITIVE INFINITELY VARIABLE SPEED CONTROL
NOW AVAILABLE IN SMALLER HORSE POWERS

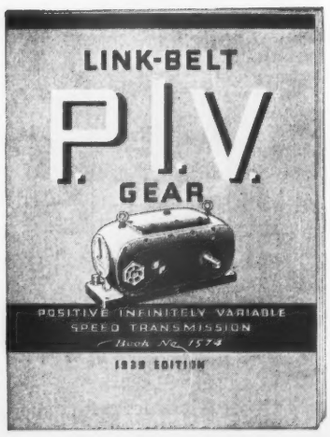




Get Dependable Help on Variable Speed Control from This New Book

● Industry can now make even broader application of P.I.V. Gear variable speed control benefits. Two new small sizes, ½ H.P. for speed ratios of 2 to 1 and 3 to 1, and 1½ H.P. for ratios of 2 to 1, 3 to 1 and 4 to 1, added to the present five sizes, meet a widespread demand that has developed in every industry, due to the many speed control problems which have been solved by this unique speed variator. The range of sizes now extends from ½ to 15 H. P.

An all-metal, compact unit, available for horizontal, or vertical mountings, in seven different models, hand or automatic control, the P.I.V. Gear offers you the opportunity of achieving simple, accurate, positive speed control. With it you can build into your machines, the versatility needed to meet today's varying production requirements.

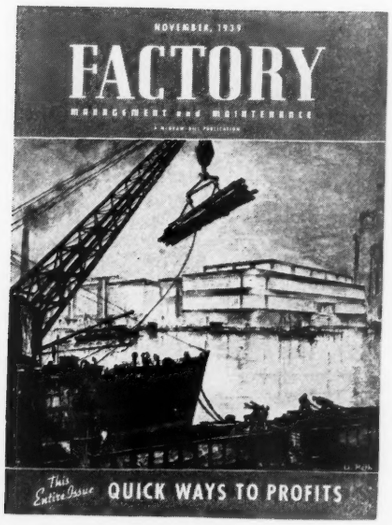


Find out about P.I.V. Gears — how industry uses them to improve quality — eliminate waste — promote uniformity — and to cut costs by reducing product spoilage. Send for Book 1574 (1939 Edition). It contains 40 pages of information and engineering data that will be helpful in solving your speed control problems.

Link-Belt Company, Philadelphia, Indianapolis, Chicago, Atlanta, San Francisco, Toronto. Offices in principal cities.

7842

LINK-BELT POSITIVE DRIVES INCLUDE



Industry, as a well-known Viennese artist sees it, is the subject of this month's cover. Lili Réthi's drawings have long been admired in the salons of Vienna, Prague, Berlin, Stockholm, and London. Although she has been in this country only a few months, her work has already received favorable recognition here. In her imaginative sketch for FACTORY, she has captured the true spirit of American industry.

●

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Factory Management and Maintenance is a consolidation of *Factory and Industrial Management* (including *"Factory"*) and *Maintenance Engineering.*

Price 35c a copy. Subscription rates—United States, Canada, Mexico and Central and South American Countries, $3 a year. All other countries, $4 a year or 24 shillings. Cable address "McGrawhill, New York." Member A.B.P. Member A.B.C. Copyright, 1939, by McGraw-Hill Publishing Co., Inc.

Factory Management and Maintenance, November 1939. Vol. 97; No. 11. Published monthly, McGraw-Hill Publishing Company, Inc. Publication office, 99-129 North Broadway, Albany, N. Y. Editorial and executive offices, 330 West 42nd Street, New York, N. Y. Entered as second class matter, November 13, 1936, at Post Office, Albany, N. Y., under the Act of March 3, 1879. *Branch Offices:* 520 North Michigan Ave., Chicago; 68 Post St., San Francisco; Aldwych House, Aldwych, London, W. C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

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A McGRAW-HILL PUBLICATION

FACTORY

MANAGEMENT and MAINTENANCE

NOVEMBER, 1939

Quick Ways to Profits.....*L. C. Morrow* 15

Lower Production Costs Mean Lower Prices, More Sales, More Jobs, More Profits

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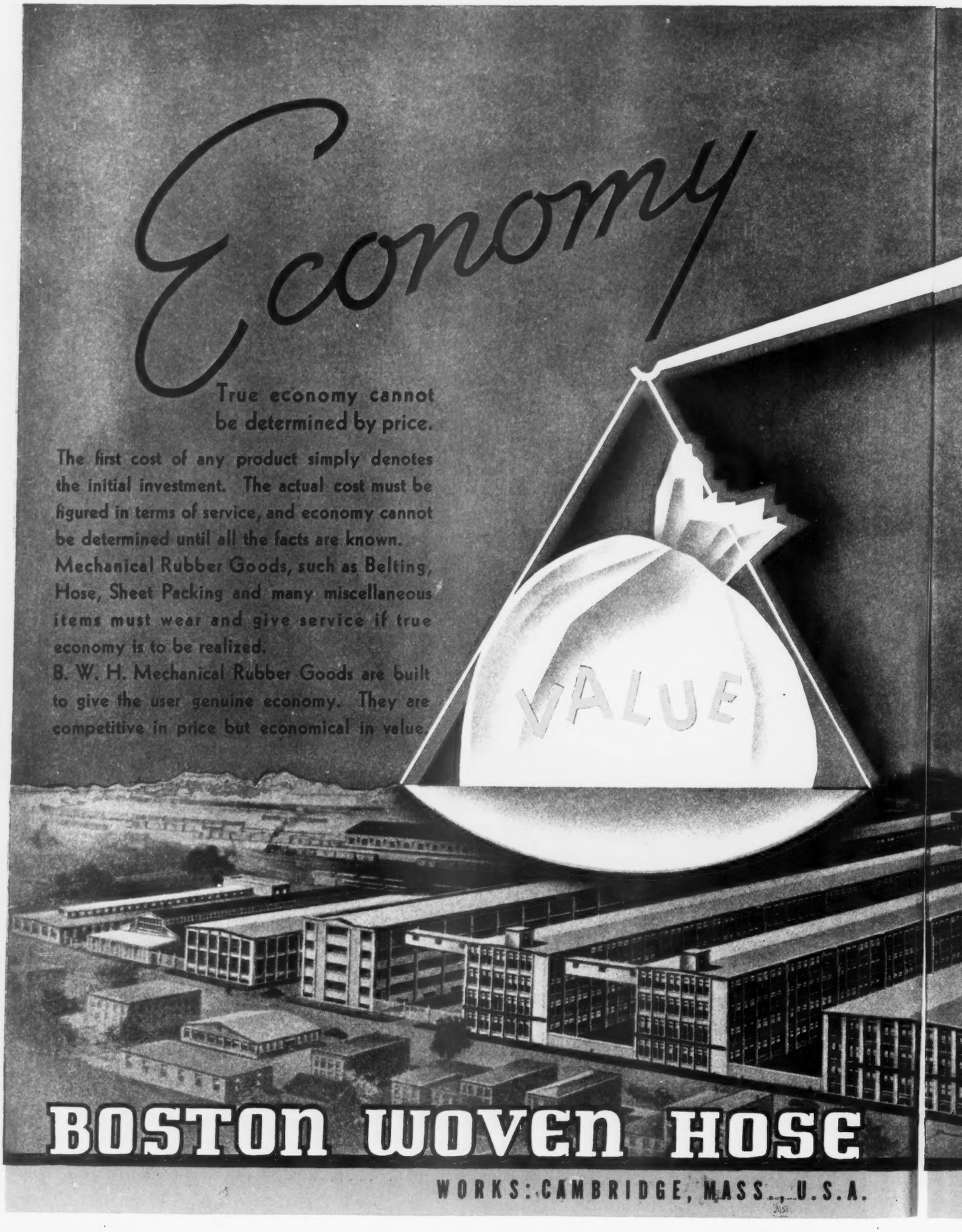
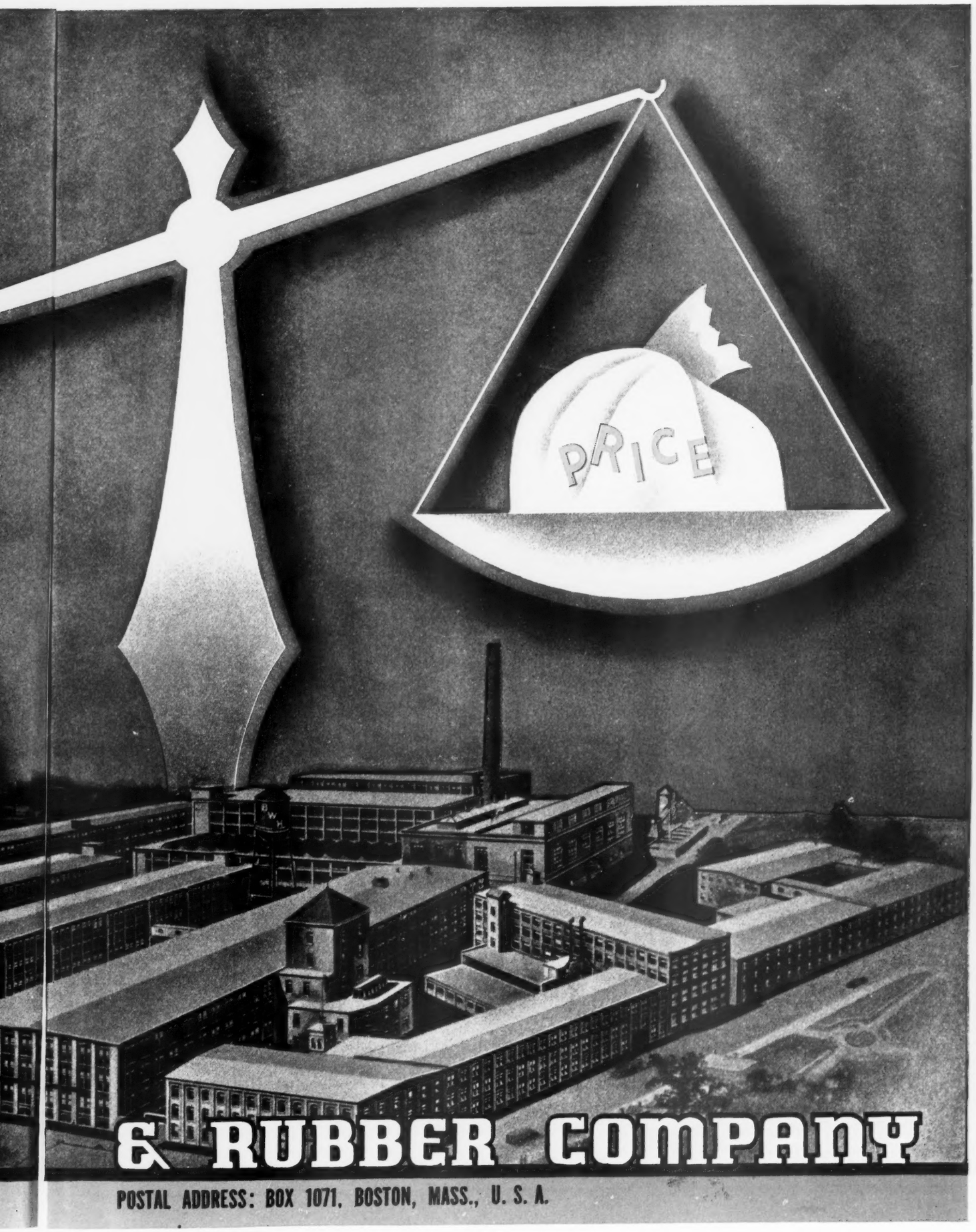

Economy
True economy cannot be determined by price.
The first cost of any product simply denotes the initial investment. The actual cost must be figured in terms of service, and economy cannot be determined until all the facts are known.
Mechanical Rubber Goods, such as Belting, Hose, Sheet Packing and many miscellaneous items must wear and give service if true economy is to be realized.
B. W. H. Mechanical Rubber Goods are built to give the user genuine economy. They are competitive in price but economical in value.
VALUE
BOSTON WOVEN HOSE
WORKS: CAMBRIDGE, MASS., U.S.A.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FOR EVERY LOAD, SPEED AND DUTY
108 DISTINCT SERIES
BALL, ROLLER AND THRUST
OVER 3000 SIZES
1/8" to 21" Bore — Metric and Inch Sizes
Write for the Catalog and Engineering Counsel
NORMA-HOFFMANN BEARINGS CORP'N.—STAMFORD, CONN., U. S. A.
"NORMA-HOFFMANN"
Separable (Magneto) Ball Bearing
Litro ("CL") Composition Retainer Ball Bearing
Single Row Ball Bearing
Double Row Self-Aligning Ball Bearing
Shielded Type Single Row Ball Bearing
Single Felt Seal Ball Bearing
Double Felt Seal Ball Bearing
9000 Series (Feltless) Sealed Ball Bearing
"Cartridge" Fully Sealed, Refillable Type Ball Bearing
Double Row Ball Bearing
Extra Light Type Ball Bearing
Duplex Type (Two Direction) Angular Contact Ball Bearing
Angular Contact Ball Bearing
Single Direction Ball Thrust Bearing
Standard Cylindrical Roller Bearing
Double Row Self-Aligning Adapter Ball Bearing
Full Type (Retainerless) Cylindrical Roller Bearing
Extra Light Cylindrical Roller Bearing
Two Lipped Cylindrical Roller Bearing

MEMORANDUM
include OSBORN BRUSHES in your plans to improve Production and Maintenance Methods!
OSBORN
MAINTENANCE EXAMPLE
Workers in a large plant had difficulty sweeping floors clean with brushes not suited to the conditions. Osborn Floor Brushes of the correct type were recommended. The floors are now swept clean at half the former cost.
OSBORN
PRODUCTION EXAMPLE
Brushes used for many years to clean moulds were replaced with Osborn Wire Wheel Brushes of a standard type used with portable tools. The work is now performed in approximately 40% less time and with less fatigue on the part of the workers.
OSBORN
BRUSHES ARE IMPORTANT
Brushes are TOOLS, used by wage-earners. Give your workers Osborn Brushes and you give them a better chance to protect the investment in their time. Better work in less time reduces costs and aids profits.
IT'S A PROFIT-HABIT TO USE
Osborn Brushes
THE OSBORN MANUFACTURING COMPANY • 5401 HAMILTON AVENUE • CLEVELAND, OHIO

Design for INDUSTRIAL EFFICIENCY by Thermoid

Thermoid Industrial Rubber Products have made very material contributions to efficiency and profits in practically every American industry. Production and maintenance engineers all over the country have learned that Thermoid Products are dependable in operation, and that their use leads directly to operating and maintenance economies.

There is a reason. Each Thermoid Industrial Rubber Product is designed and manufactured with a practical engineering knowledge of the job it has to perform. In addition, only the finest raw materials and modern production methods are used in their manufacture.

It will pay you to specify Thermoid Industrial Rubber Products. Engineering consultation upon individual problems is available at all time without obligation.

Thermoid INDUSTRIAL RUBBER PRODUCTS QUALITY VALUE SERVICE

More than half a century of Progressive Engineering and Product Development

THERMOID RUBBER, DIVISION OF THERMOID COMPANY, TRENTON, N. J.

Standard types of belting made by Thermoid:
Transmission Belting
Conveyor Belting
Multiple V Belts
Grader Belting
Canners' Belting
Bucket Elevator Belting

Thermoid

Standard types of hose made by Thermoid:
Air Hose
Water Hose
Steam Hose
Tank Truck Hose
Gasoline Hose
Suction Hose

BELTING · HOSE · PACKINGS · BRAKE LININGS

Do the lubricants you are using possess the *Essential Qualities* you need?

Effects of slight differences in oil quality, readily demonstrated by Gulf Research technologists, may have a great influence on the profitable operation of your machinery.

This sensitive machine in the Gulf laboratory is used to measure differences in friction for oils applied to bearing surfaces in various ways. It also shows how much of the qualities popularly known as "oiliness" and "film strength" an oil possesses.

TWO oils may look exactly alike, may have the same "specifications." But, subjected to high operating temperatures, one may depreciate more rapidly than the other and fail to protect bearings against wear and replacement.

How can you be sure you are using lubricants which possess the essential qualities modern research and advanced refining methods have made possible today? Ask a Gulf engineer to check over your equipment and recommend the oils and greases exactly suited to each bearing, gear, and moving part. Then see that his recommendations are adopted. Thus you can insure smoother machine operation, greater productivity and lower maintenance costs for all your equipment—benefits that cannot be predicted in an oil specification.

In 30 states from Maine to Texas, Gulf offers this cost-reducing lubrication service to public utilities, railroads, industrial and marine operating companies. More than 1100 Gulf warehouses make these higher quality oils and greases quickly available to you. Write or phone your nearest distributing point today... Gulf Oil Corporation—Gulf Refining Company, Gulf Building, Pittsburgh, Pa.

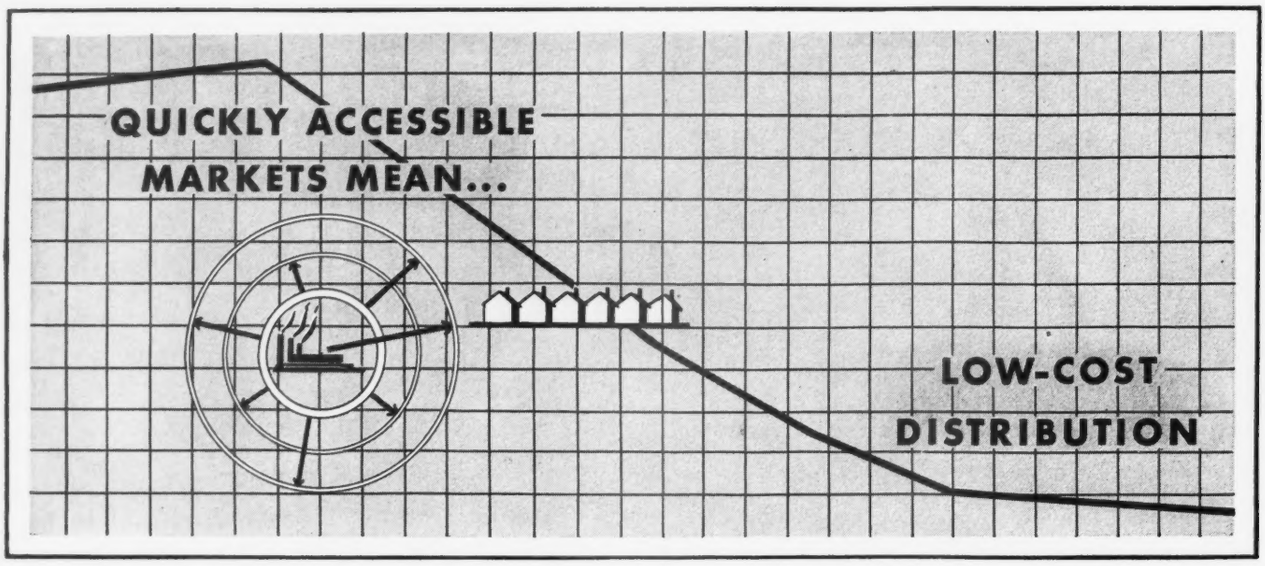
Maintenance Costs Reflect Lubrication Efficiency

A large textile operator says: "We've completely eliminated vibration in our large twister spindles since changing to Gulfgem Oil for spindle lubrication. Our production has been greatly improved and maintenance costs reduced."

The superintendent of a large Diesel power plant says: "We're saving $350.00 per month—sliced from our maintenance bill since we accepted this Gulf engineer's recommendations and placed Gulf's higher quality Diesel oils in service."

GULF INDUSTRIAL LUBRICATION

ALSO A COMPLETE LINE OF FUEL AND FURNACE OILS



...and MAJOR MARKETS are within first to third morning delivery range

of Chesapeake and Ohio Territory

Whatever plant location you choose within Chesapeake and Ohio Territory, you will find it a low-cost distribution center. Running through the heart of Virginia, West Virginia, Kentucky, Ohio and Indiana, Chesapeake and Ohio Lines divide the population east of the Mississippi—an area containing most of the major markets and approximately 70% of the United States population.

Industries in Chesapeake and Ohio Territory have the country's principal consuming areas within first, second, or third morning delivery range. For instance, from Charleston, West Virginia—almost at the middle of Chesapeake and Ohio's main line—New York is only 50 hours away by fast schedule freight. Toledo, 21 hours, Boston, 72 hours. Chicago, 33 hours. The port of Newport News, 27 hours. Second or third morning delivery in Southern territory.

Add to the accessibility of distant markets such close-at-hand advantages as abundant raw materials and fuel, plentiful native-born labor, cheap power, cooperative legislation, available industrial sites...and you begin to see some of the dominant values of location in Chesapeake and Ohio Territory.

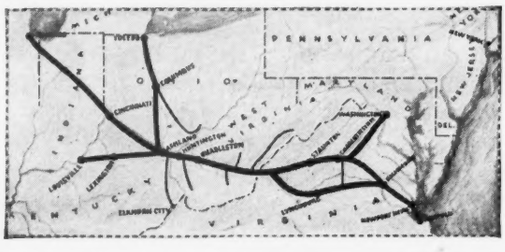
What do you seek in a more advantageous location? Complete and impartial factual surveys for your specific industry will be furnished on request. All inquiries will be held in strictest confidence. Write

GEORGE D. MOFFETT, *Industrial Commissioner*
CHESAPEAKE AND OHIO LINES
Huntington, West Virginia

THESE ADVANTAGES

are but the fundamentals of many favorable conditions making Chesapeake and Ohio Territory an economic field of operation for many industries.

- RAW MATERIALS of many kinds; abundant, near at hand, economically secured.
- INTELLIGENT LABOR—native-born; largely skilled in a diversity of industries; well housed; peaceful and cooperative.
- NEAR TO MARKETS—major consuming areas within first, second or third morning delivery.
- EXCELLENT TRANSPORTATION—favorable freight rates and dependable service keep markets and manufacturers in economically close touch.
- CHEAP POWER—abundant coal, oil, natural gas and hydro-electric developments assure this region of unlimited power at most economical costs.
- COOPERATIVE LEGISLATION—Industry is king in Chesapeake and Ohio Territory, and the legislatures of the five great States in which it lies are friendly toward the needs and aims of enterprises they invite and those they already have.



CHESAPEAKE *and Ohio* LINES

YOU CAN DO IT BETTER WITH GOODYEAR RUBBER

The Pipe Dream

A DRAMA OF ABRASION IN THREE ACTS

GM-Specified
GOODYEAR STYLE M SUCTION HOSE
for mortar discharge lines
copper milling
A
B
C
D
A—Extra heavy tube specially compounded to resist abrasive wear
B—Rubber-impregnated duck ply anchors tube to carcass
C—Heavy wire spiral prevents expansion under pressure
D—Multi-ply carcass of heavy duck with super-tough rubber cover.

ACT ONE: huge copper milling plant perplexed by rapid abrasion of heavy cast iron pipe lines used to "float" crushed ore from stamping machines. Sharp, gritty "slime" cuts through pipes, causing frequent breaks and leaks that necessitate shutdowns to replace pipe. Maintenance expense a nightmare. Then, enter the G.T.M.—Goodyear Technical Man.

ACT TWO: G.T.M. makes careful analysis and recommends replacing metal pipe with Goodyear Style M Heavy Duty Suction Hose. Sounds like a pipe dream but mill agrees to trial and hose is installed on lines.

ACT THREE *(seven years later)*: mill compares record of Goodyear Style M Hose with metal pipe. Finds no failures, no repairs, no shutdowns in seven years. Saving in labor charges on maintenance alone has more than paid entire cost of hose installation! Other savings are pure profit. Abrasion problem licked. Everybody happy!

• • •

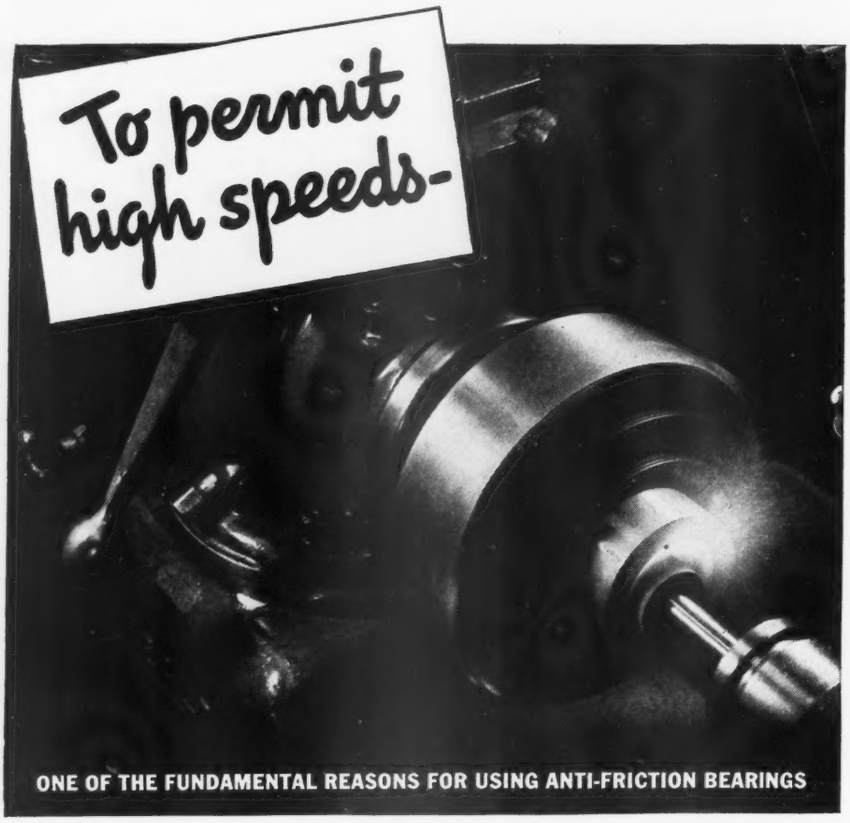
Goodyear rubber is finding many new uses in industry today where wear is a paramount problem. Let the G.T.M. show you how you can cut costs with rubber—correctly specified and applied. To bring him to your office, write: Goodyear, Akron, Ohio, or Los Angeles, Calif.—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

Centennial of Charles Goodyear's discovery of the vulcanization of rubber

THE GREATEST NAME IN RUBBER

GOODYEAR

WHY ANTI-FRICTION BEARINGS?



ONE OF THE FUNDAMENTAL REASONS FOR USING ANTI-FRICTION BEARINGS

● When fault exists in any type of bearing, high speed will inevitably bring it to light . . . in excess heat and wear. Thus, high speed machine operation is at once a test of the accuracy with which a bearing is made and of the efficiency of the basic bearing design.

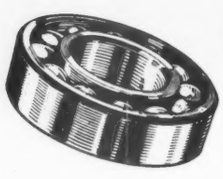
Significant then is the fact that each year more manufacturers of machine tools and other high speed machinery standardize on ball bearings . . . on New Departure ball bearings, used throughout industry wherever wheels or shafts turn.

For interesting brochure, FT-12, "Ball Bearings for Higher Speeds," write New Departure, Division of General Motors, Bristol, Connecticut.

Spectacular Proof
that New Departures
Permit High Speeds

Many high speed machines operate at between 5,000 and 10,000 r.p.m. A notable exception is the Madison-Kipp air grinder which runs at 50,000 r.p.m.—and which runs successfully on New Departure ball bearings.

NEW DEPARTURE

THE FORGED  STEEL BEARING

2825

FACTORY
MANAGEMENT and MAINTENANCE
L. C. MORROW, Editor

Quick Ways to Profits

PROFITS ARE ESSENTIAL in the American way of doing things. Our country has been built on the profit system. The opportunity to make profit has inspired invention, stimulated design, encouraged the investment of capital. The end result is a country rich in the products of industry, with a consequent high standard of living.

This result has come about because industry has sold its products at prices so low that many people have been able to buy them.

How could prices be so low, and industry still make a profit? Actually it is because industry has learned to make its products at lower and lower costs. As these lower costs have been passed on to buyers in the form of lower prices, still larger quantities have been bought, new savings made in production costs, prices lowered still further, still greater quantities sold.

This has been the history of the profit system. It is a history that includes the creation of entirely new industries, with attendant jobs — the development of vast service industries — the elimination of back-breaking toil — and the reduction of working time.

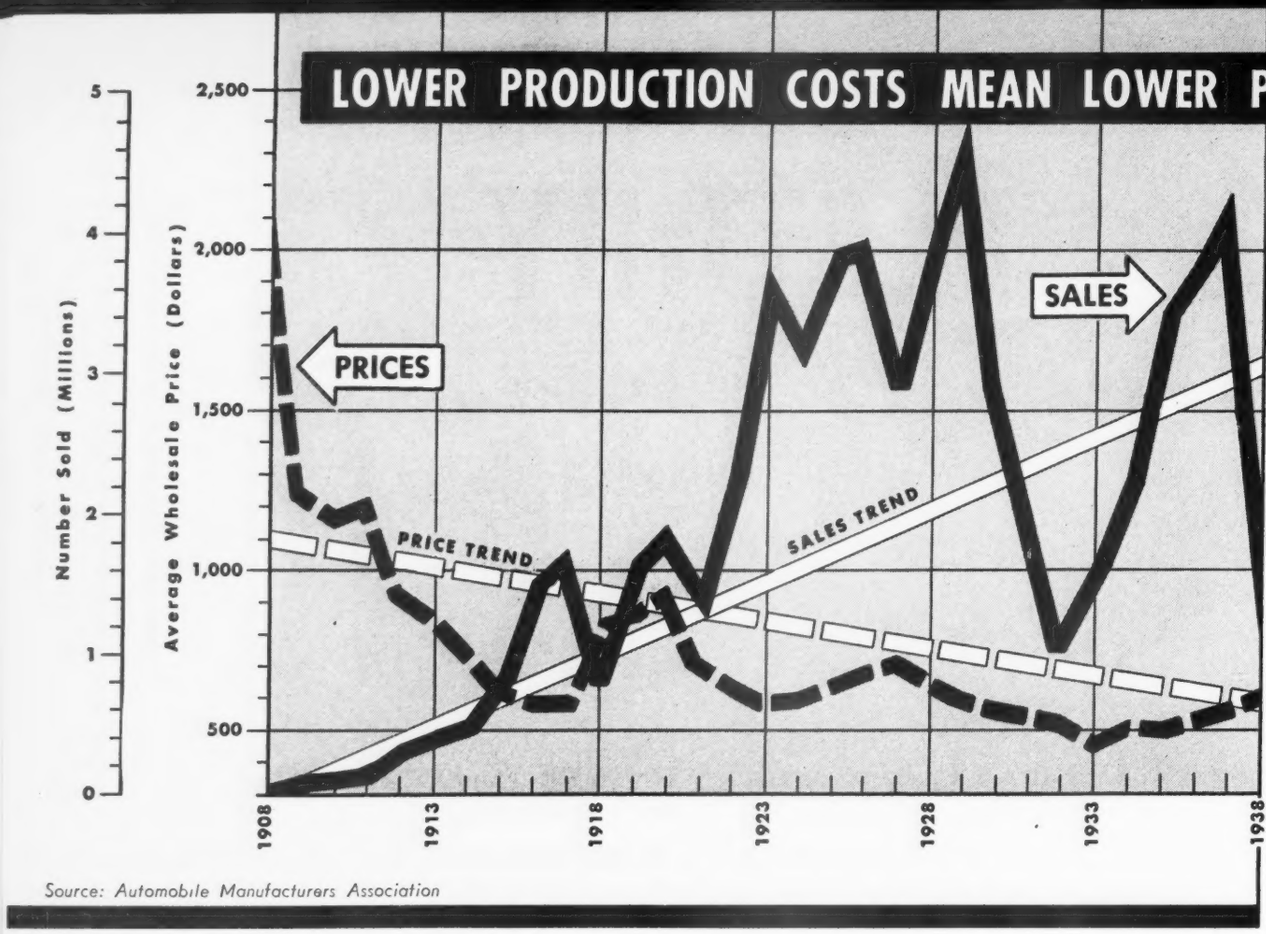
* * *

Our preamble should make obvious the objective of this issue of FACTORY. It is to do in concentrated form what the other issues of the year do in more extended fashion.

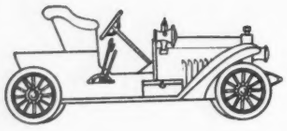
And that is to provide the plant operating personnel of the manufacturing industries with inspiration and information for still further cost reduction — still further waste elimination. All this in the interest of more sales, more orders, more jobs. In a word, more things for more people — with profit for the makers, more jobs for workers.

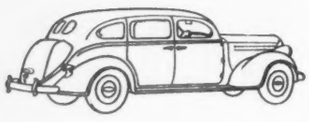
Quick Ways to Profits, we say. Why quick? Are they short cuts? Not necessarily; they may be or they may not. But most of the methods and ideas presented can be put to work promptly. Most of them do not involve elaborate surveys and calculations. And all are told about briefly. Therefore "quick" ways to profits.

L C Morrow



Source: *Automobile Manufacturers Association*





AUTOMOBILES

(PASSENGER CARS)

JUST 30 YEARS AGO, in 1908, the average wholesale price of a passenger automobile was $2,130. In that year all the makers sold only 43,300 cars.

For the years 1937-38,* the average wholesale price for a passenger car was $602. At that price an average of 3,096,840 cars were sold.

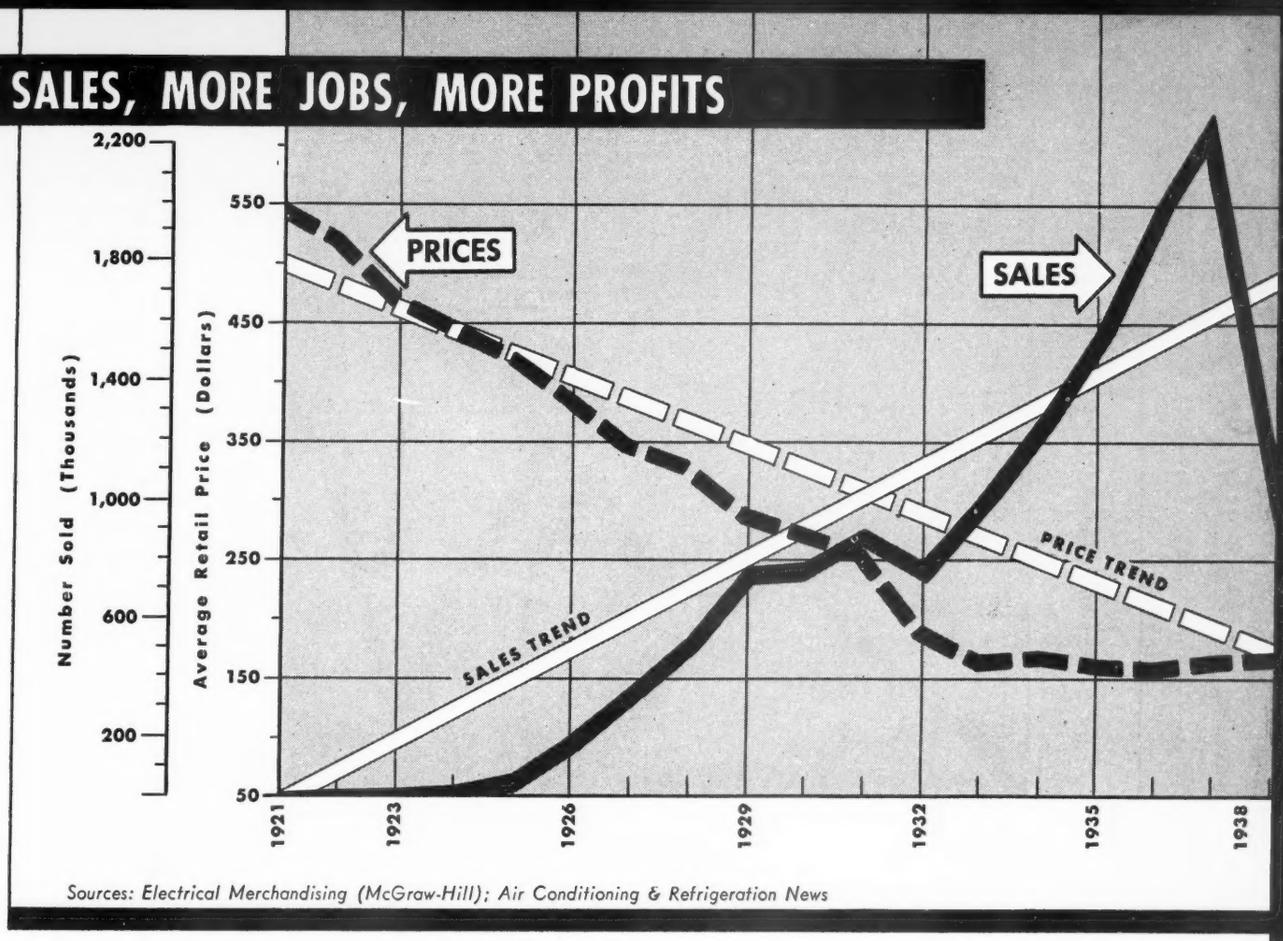
This comparison is made in dollars. But what of the car itself? What is the buyer receiving for his money? Just take the Chevrolet, for example:

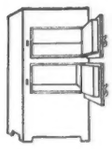
In 1913, for $1,125, the delivered price (at Flint), the buyer got an open car, with a 4-cylinder, 31-hp. engine, that cost him 50 cents a pound.

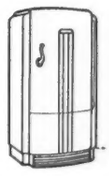
Today (1939), for $782.55, or 26 cents a pound, he gets a sedan, with 6-cylinder, 85-hp. engine, more speed, comfort, reliability, durability.

Lower production costs have meant better automobiles at lower prices for more people.

*In this and the following charts the *average* prices and the *average* sales for the years 1937 and 1938 have been used. This procedure has been followed because business was good in 1937 and poor in 1938. The figures for either year, taken by themselves, would give a distorted picture. The *average* figures give a true picture of recent price and sales conditions.







REFRIGERATORS

(HOUSEHOLD ELECTRIC)

In 1921 — eighteen years ago — when the average selling price was $550, only 5,000 household electric refrigerators were sold. In 1937-38 users bought an average of 1,775,000 each year, at an average price of $171.35.

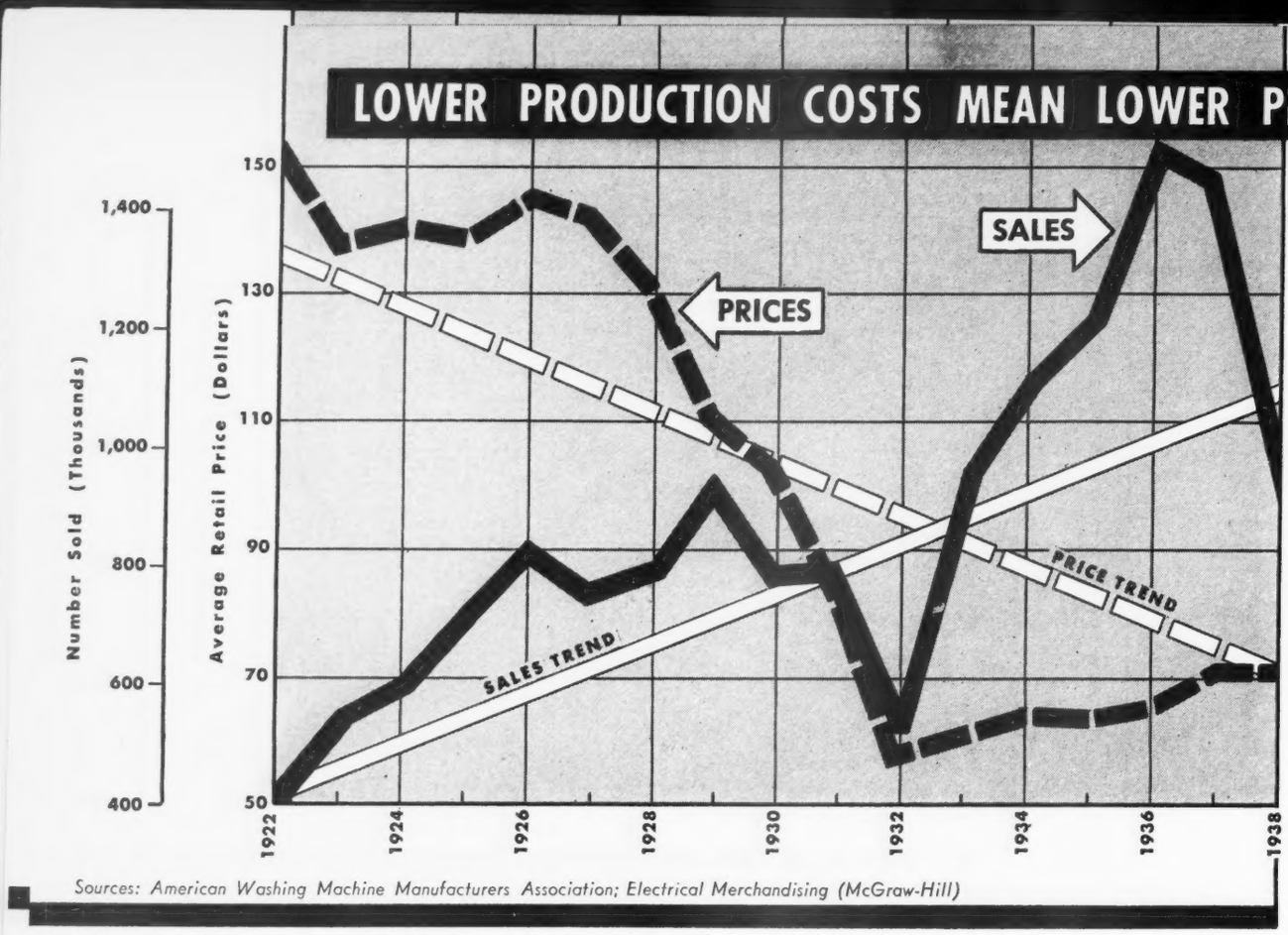
In 1921, the buyers got protection for food — except in cases of breakdown, which were frequent. They got ice cubes — and it took plenty of time to make them. They got noise — a lot of it. Cost of operation, high.*

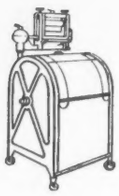
Today the electric refrigerator is virtually free from breakdown — delivers ice cubes (and many more of them) in jig time — is practically noiseless in operation. Cost of operation, low.*

Greater storage convenience, better appearance, increased durability are additional values at the lower prices of today.

Lower production costs have meant better electric refrigerators at lower prices for more people.

*A Southern power company, in a series of tests comparing 1936 with 1930 refrigerators, found a reduction in current consumption of 44 per cent.





CLOTHES WASHERS

(ELECTRIC)

IT TOOK A LONG TIME to get Mrs. America started out of the washtub. But once on her way she moved rapidly as manufacturers made better and better clothes washers and sold them at prices that went down and down.

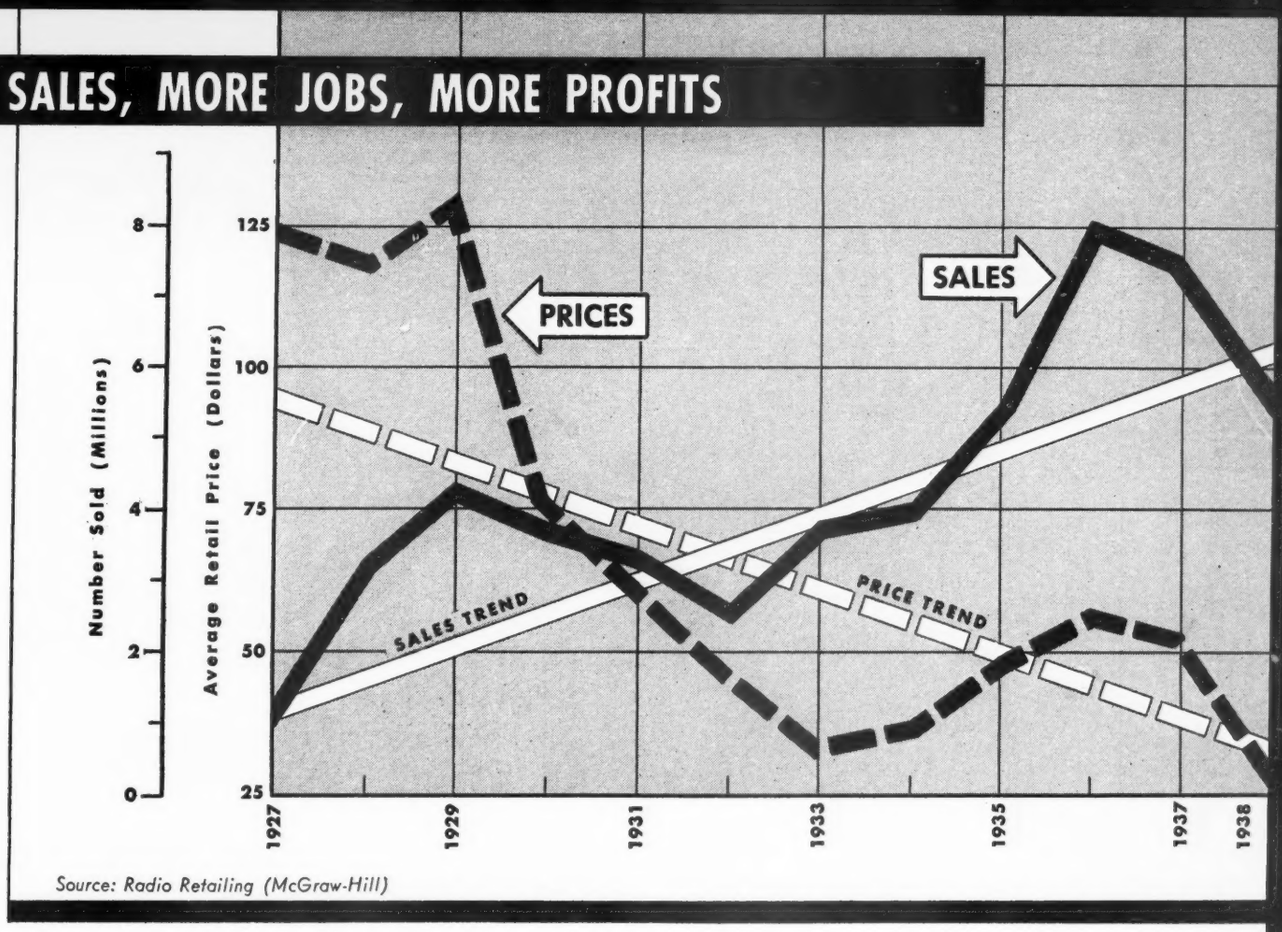
In 1922 only 422,927 American housewives benefited from washtub emancipation. At that time the average price was $154.

Today the number of emancipated housewives is something to think about. In the years 1937 and 1938, at an average price of $72, American families bought 2,496,758 electric clothes washers, 1,248,379 each year.

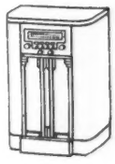
What more does the washing machine user get for today's dollar than she got for the dollar of 1922? Greater load capacity, lower consumption of hot water, one-third more speed per pound of clothes, better wringing, button protection, large rubber casters, unbreakable rubber plugs, rubber cords, drainage by pump, self-oiled motors, beauty in design.

Lower production costs have meant better clothes washers at lower prices for more people.

MORE SALES, MORE JOBS, MORE PROFITS



Source: *Radio Retailing (McGraw-Hill)*



FACTORY-BUILT RADIOS

(HOME AND AUTOMOBILE SETS)

RADIO HAS BECOME a part of our standard of living. It is no task at all to remember the days of homemade sets, when manufactured radios were almost custom built and prices were prohibitive.

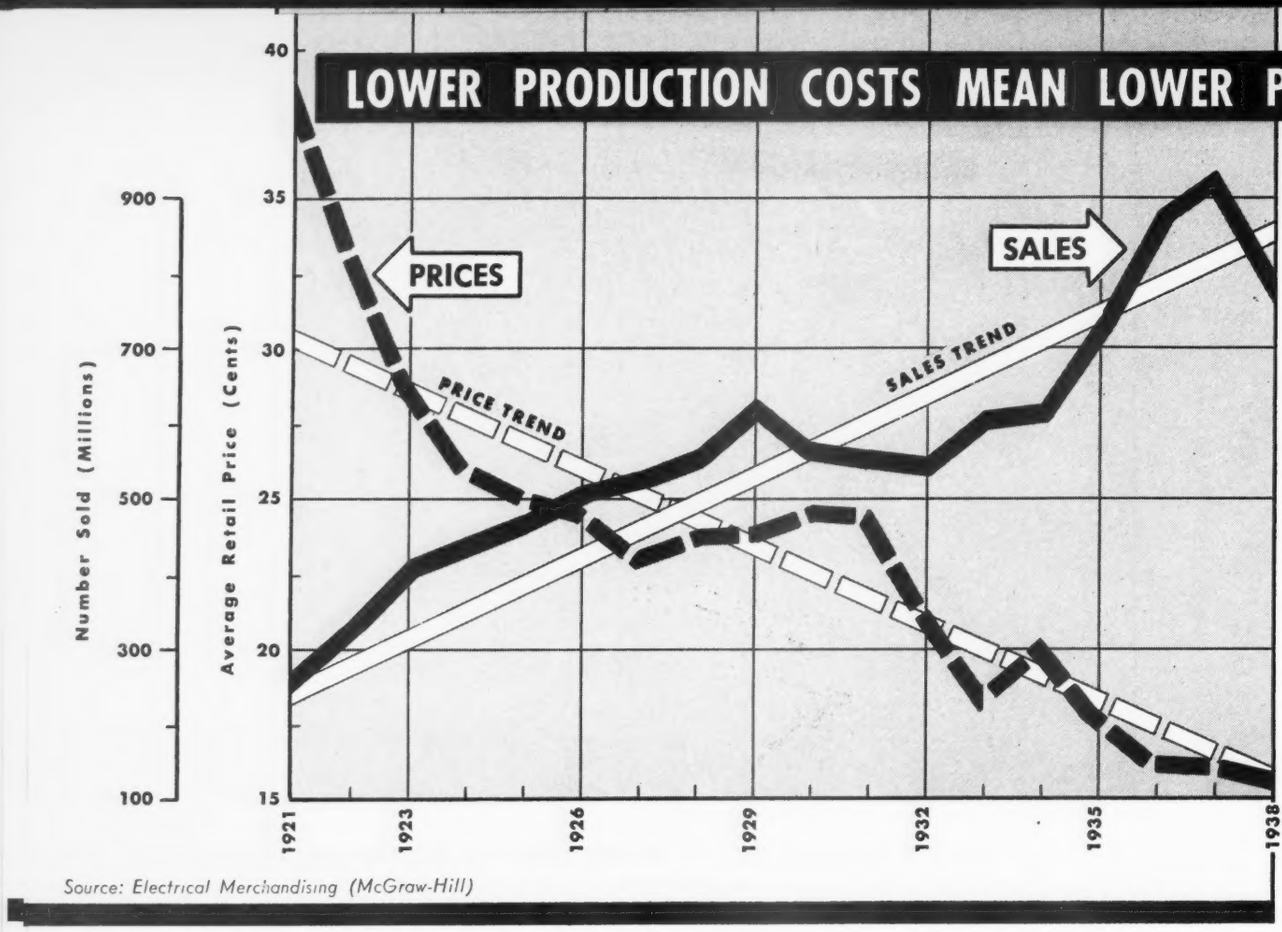
In 1927 the average price of a radio was $125. The number sold during that year by all manufacturers was small — only 1,350,000.

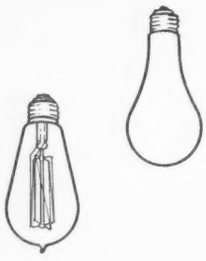
In 1937-38, at an average price of $43, a total of 13,454,266 sets were sold — an average of 6,727,133 for each of the two years.

The battery set predominated in 1927. And a lot of grief was bought along with the radio — battery and charger filling, aerial complications, poor selectivity, lack of fidelity, high tube prices, quick obsolescence.

Today, most sets are for direct plug-in; require no aerials; have automatic tuning, precise selectivity, and practically perfect fidelity. Tube prices are away down. In fact, radio is almost trouble-free.

Lower production costs have meant better radios at lower prices for more people.





ELECTRIC LIGHT BULBS

(INCLUDING MINIATURE)

ONLY SIXTY YEARS AGO the electric light bulb was born. What a luxury it was — and how fragile! How few people could own them in those days.

As late as 1921 the electric light bulb sold at the average price of 39 cents. Size for size it gave much less light than the bulb of today. Size for size it burned much more current.

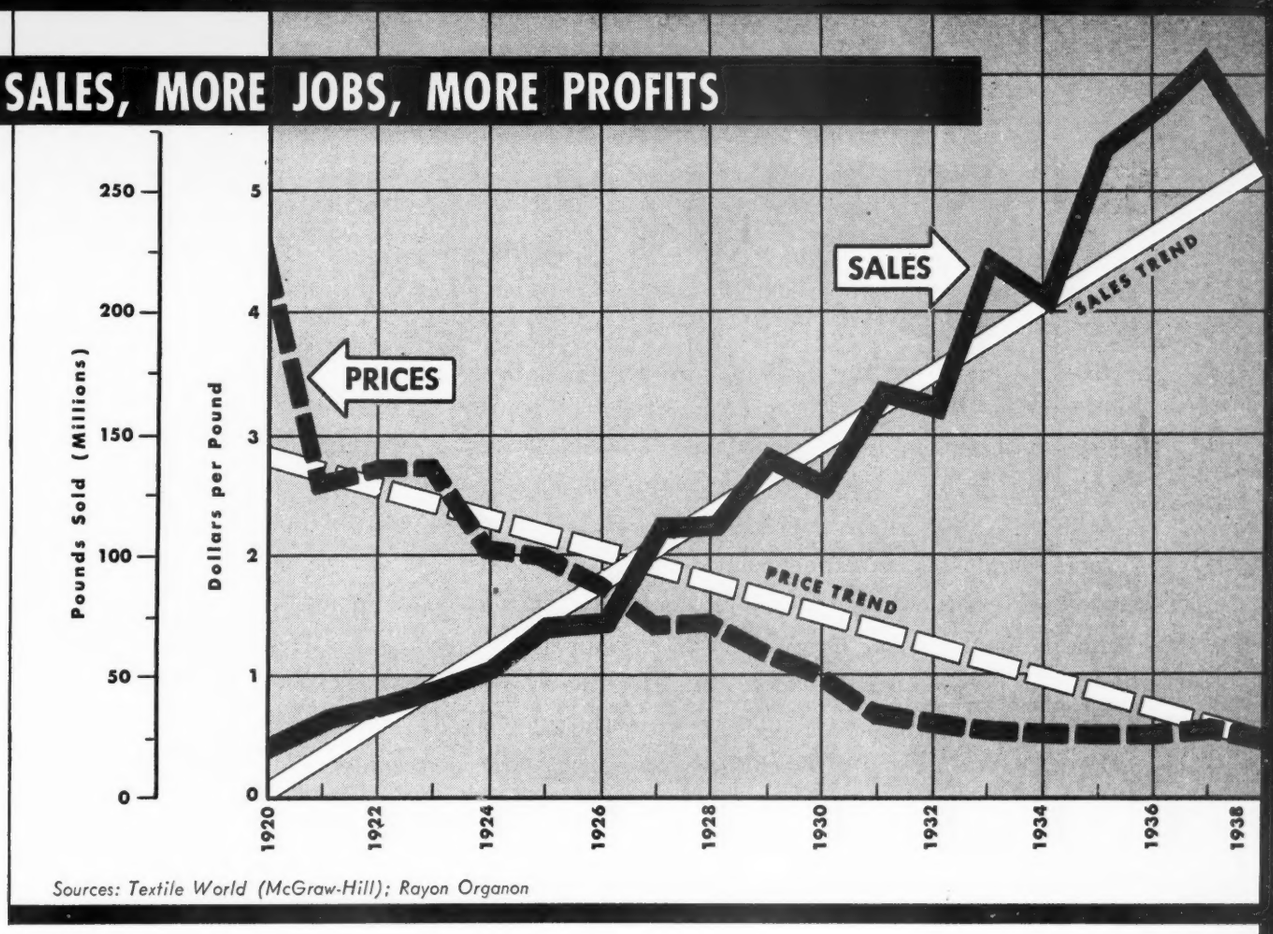
Today, at the average price of 16.1 cents, the electric light bulb gives 67 per cent more light than the 1921 bulb of the same wattage. Or, put the other way, the amount of light given by the 1921 bulb can be had today with 40 per cent less current because bulbs are better.

At 39 cents, in the year 1921, 268,291,965 bulbs were sold in the United States. Seeing by electric light cost money in those days.

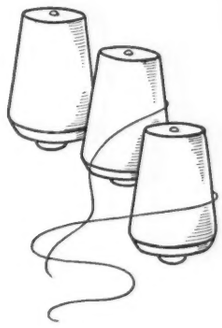
At 16.1 cents, an average of 867,750,000 bulbs were sold in each of the years 1937 and 1938. People began really to see at night.

Lower production costs have meant better seeing at lower prices for more people.

MORE SALES, MORE JOBS, MORE PROFITS



Sources: Textile World (McGraw-Hill); Rayon Organon



RAYON YARN

(150-DENIER VISCOSE)

RAYON IS A FINE EXAMPLE of the price-sales relationship. In 1920 the average price for the year was $4.60 a pound. In the years 1937 and 1938 the average yearly price was 57 cents a pound.*

Less than 10,000,000 pounds were sold in 1920; the average yearly sale for 1937 and 1938 was 289,798,500 pounds.

The buyer of rayon fabrics today can get more meritorious products, of greater beauty, than he could get in 1920. These better products result from improvements in twisting, warping, sizing, weaving, and finishing.

He can get, also, rayons to do highly specialized jobs; for example, the reduction of internal heat in automobile tires, accomplished by the use of high-strength viscose yarn.

Lower production costs have meant better rayon products at lower prices for more people.

*Prices quoted are for 150-denier, first quality, minimum filament, bright luster, viscose process skeins, at New York, as quoted by a large viscose producer.

HOW TO USE THIS ISSUE

FACTORY'S EDITORS have designed this issue of "Quick Ways to Profits" to be used in two ways: (1) as an idea provoker; (2) as a reference work or handbook.

Reading procedure for the man looking for ideas can take the form of leafing through the pages until an idea strikes him. Or it can take the form of diligently reading from cover to cover. Or he can pick out on the contents page the classification or classifications in which he is most interested, turn to the pages containing them, and do a concentrated job.

When the issue is to be used as a handbook, reading procedure should take the form of prompt, careful examination to extract immediately usable ideas. At the same time mental note should be made of the material likely to be of service as time goes on and other problems come up.

But the issue will not have served its purpose completely unless its recipient makes certain that all the men in the plant who might be stimulated to evolve cost-cutting plans have their opportunity to study it. So extensive circulation of each copy is recommended.

Boiled down, those are the editors' ideas of how the issue can be used to greatest advantage. Now what can be learned from the experiences of readers of last year's "Quick Ways to Profits" issue? Many of those readers have told us. We pass along in the following paragraphs some of their methods. Plant man is talking to plant man.

Industrial Engineer, Chemical Plant

I have spent 12 full hours reading, re-reading, and digesting . . . let me know how soon we can expect our first shipment of extra copies for our foreman discussion groups.

Vice-President, Scale Plant

I have already ordered 30 copies for distribution to our foremen and departmental heads.

Superintendent, Plastics Plant

It is my idea to put these "Quick Ways" into the hands of our responsible supervisors and have them review a definite number of these ways each week with the idea of obtaining all possible good from the means that other people have worked out.

General Manager, Aeronautic Equipment Plant

I find many excellent men who do not have the ability to do original thinking but if given a stimulating lead can do wonders. For this reason, I should like you to send me 10 additional copies so that each department head may have a personal copy.

Secretary, Business Machine Plant

I want another copy as I intend to make clippings of the one I have and route the different sections to the heads of the departments who would be interested.

Plant Executive, Knitting Plant

We should like to get several copies. These are to be used in mill council meetings in our nine plants.

Factory Manager, Screw Manufacturing Plant

The issue was astounding to the foremen who were never trained in cost reduction and methods improvement, and it was also very instructive and illuminating to foremen and all men working on methods improvement. It brought home the realization that cost reductions and method improvements are possible on practically all operations and in all places where materials are processed or handled.

General Manager, Printing Plant

Reading through this issue at home I checked 27 items that I am sending out to 14 persons in our organization for their consideration.

General Superintendent, Dust Collecting Equipment Plant

Fifteen copies were distributed among our key factory men. We run off the items on a duplicating machine and at 10 o'clock each work day these key men are handed a standard letter-size sheet with one of the items written thereon. Our men not only have their own copies of FACTORY containing the Quick Ways, they also have a daily reminder.

Vice-President, Box Manufacturing Plant

I am passing this issue on to operating men in my department, asking them to list 10 specific items that they think will be helpful to our operation.

Works Manager, Handling Equipment Plant

I am in the midst of reviewing the subject in detail, after which I propose to hand the issue to our Methods Department and ask them to check each suggestion.

Plant Executive, Electrical Equipment Plant

I sat down of an evening and read it through from cover to cover. Many of the sections that apply to our problems I marked and then passed the magazine on its rounds through the factory.

CHARLES O. DALTON, *B.S.E.E., Purdue, 1930. Receiving clerk, purchasing agent, time-study engineer, chief industrial engineer. Assistant superintendent, Basca Manufacturing Company. Now chief engineer, Trainor National Spring Company. A keen student of scientific management. Hobbies: stamp collecting, writing. Favorite recreations: golf and bowling. Favorite sports: football, basketball, and baseball*

P. H. KEENEY, *B.S. in Mechanical Engineering, University of Tennessee, 1918. Saw war service both in this country and in France. Associated with Brock Candy Company since 1923. Now chief mechanic, he spends the major part of his time designing and building new machines for making and handling candy. Hobbies: his job and tinkering with his automobile engine in his spare time—if and as he has any*

Winners of the FACTORY *Awards*

Again this year FACTORY offered cash awards for reports on cost-cutting accomplishments. All employees in the manufacturing industries were eligible to compete for the 53 prizes. The names of the winners follow immediately, after which appear the entries that won the three major prizes. The remaining 50 prize-winning entries are published in this issue in the appropriate sections. Those awarded $10 prizes are designated by two asterisks (**); those awarded $5 prizes are designated by a single asterisk (*)

$100 AWARD

Charles O. Dalton, Chief Engineer, Trainor National Spring Co., Inc., New Castle, Indiana

$50 AWARD

P. H. Keeney, Mechanical Engineer.....Brock Candy Co., Chattanooga, Tennessee

$25 AWARD

Willis H. Jones, Master Mechanic.....Pratt & Lambert, Inc., Buffalo, New York

WILLIS H. JONES, *grammar school education. Went to work at 14. Enlisted in 1918. Instructor in gas engines at Clarkson Tech. Transferred to Georgia, finally to Fort Sill. Master mechanic at Pratt & Lambert since 1922. Hobbies: fishing and hunting, but spends most of his spare time in summer improving his summer home at Silver Lake, New York*

SEE NEXT PAGE FOR $10 AND $5 AWARD WINNERS

15 AWARDS OF $10 EACH

T. O. Armstrong, Supervisor, Industrial Relations, Westinghouse Electric & Mfg. Co., Springfield, Mass.

E. D. Burdick, Assistant Treasurer, Kaukauna Machine Corporation, Kaukauna, Wis.

John A. Carraro, Plant Layout Engineer, International Harvester Company, Incorporated, Indianapolis

Don Z. Decker, Cost Clerk, Wilson & Company, Incorporated, Oklahoma City, Okla.

B. R. Eckstein, Factory Manager, Gotham Silk Hosiery Company, Incorporated, Philadelphia

Walter G. Fremont, Department Supervisor, Standard Register Company, Dayton, Ohio

George S. Hulse, Supervisor of Time Study, F. W. Sickles Company, Springfield, Mass.

Charles E. O'Connor, Works Auditor, Tractor Works, J. I. Case Company, Racine, Wis.

W. Puckey, Works Manager, Hoover Limited, Perivale, Middlesex, England

Edwin C. Rosenberg, Chief Engineer, F. Rosenberg Elevator Company, Milwaukee

E. F. Sibley, Chief Power Plant Engineer, Seamless Rubber Company, New Haven

C. D. St. Clair, Works Manager, American Machine & Metals, Incorporated, East Moline, Ill.

Harvey D. Stewart, Electrician, Climax Molybdenum Company, Climax, Colo.

J. L. Wood, Manager, Maintenance Cost & Standards, Michigan Alkali Company, Wyandotte, Mich.

James Winston, Production Manager, Valley Engineering Company, San Bernardino, Calif.

35 AWARDS OF $5 EACH

T. O. Armstrong, Supervisor, Industrial Relations, Westinghouse Electric & Mfg. Co., Springfield, Mass.

Arthur R. Baldwin, Industrial Engineer, Bristol Company, Waterbury, Conn.

Arthur Bradshaw, Time Study Engineer, York Knitting Mills, Limited, Woodstock, Ont., Canada

Guy C. Close, Jr., Time Study Foreman, United States Aluminum Company, Fairfield, Conn.

J. G. Deming, Superintendent, Albers Brothers Milling Company, Los Angeles

Guy Dickey and C. P. Wagner, Accounting Staff, Fisher Brass, Incorporated, Marysville, Ohio

W. T. Estlick, Plant Engineer, The Ansonia O & C Company, Ansonia, Conn. *(two $5 awards)*

J. R. Evans, Accountant, Armstrong Cork Company, Millville, N. J.

Thomas E. Fehringer, Cost Estimator, Colonial Radio Corporation, Buffalo

P. E. Haggerty, Assistant General Manager, Badger Carton Company, Milwaukee

William P. Harsh, Hall Brothers, Incorporated, Kansas City, Mo.

George A. Hilbert, Industrial Engineer, Forstmann Woolen Company, Passaic, N. J.

Fred L. Hull, Sugar Boiler, The Great Western Sugar Company, Loveland, Colo.

M. I. Katzner, Radio Shop Superintendent, Le Materiel Telephonique, Boulogne s/S, France

O. F. Long, Maintenance Superintendent, Fisher Tennessee Division, General Motors Corporation, Memphis

J. Lyon, Assistant General Manager, Lyon Rural Electric Company, San Diego, Calif.

R. W. Mallick, Plant Layout Engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh

Charles E. O'Connor, Works Auditor, Tractor Works, J. I. Case Company, Racine, Wis.

James L. O'Neill, Plant Superintendent, Amity Lamp Corporation, Garwood, N. J.

I. G. Ostendorf, Layout Department, Standard Register Company, Dayton, Ohio

C. P. Pittman, Assistant Engineer, Lilliston Implement Company, Albany, Ga.

J. M. Robins, General Manager, Yankee Metal Products Corporation, East Norwalk, Conn.

Edwin H. Schaeffer, Industrial Engineer, J. E. Ogden Company, Bayonne, N. J.

Harold M. Scherr, Plant Foreman, The Juvenile Manufacturing Company, Inc., San Antonio

R. A. Shaw, Director of Safety, The Murray Corporation of America, Detroit

R. C. Stark, General Superintendent, Pratt & Lambert, Incorporated, Buffalo

John H. Stoutenberg, Assistant Plant Engineer, The Stanley Works, New Britain, Conn.

S. R. Teranes, Industrial Engineer, Hamilton Manufacturing Company, Two Rivers, Wis.

Frank M. Voelkl, Superintendent Pressroom, Standard Register Company, Dayton, Ohio

H. E. Wenrich, Machinist, Paulton Silk Corporation, Berwick, Pa.

Claire Wilcox, Efficiency Man, Potlatch Forests, Inc., Lewiston, Idaho

Philip H. Wilmarth, The Blanchard Machine Co., Cambridge, Mass.

H. Wilson, Purchasing Agent, Carolina Power & Light Company, Raleigh, N. C.

James Winston, Production Manager, Valley Engineering Company, San Bernardino, Calif.

THE THREE MAJOR AWARD WINNERS

THIS QUICK WAY WON THE $100 AWARD

Down Go Power Bills; Shutdowns Cease

CHARLES O. DALTON
Chief Engineer, Trainor National Spring Company, Incorporated
New Castle, Ind.

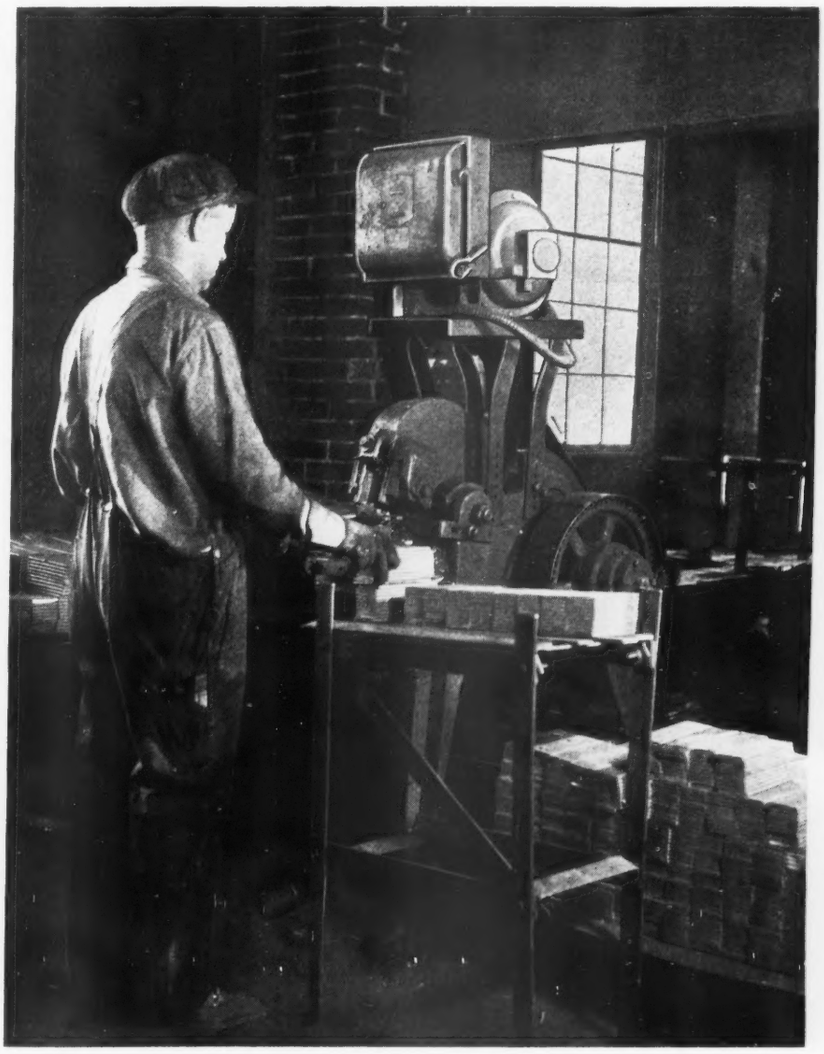
SIMULTANEOUS complaints from the production superintendent about delays and shutdowns caused by motor trouble, and from the plant manager about high power bills, led us to make a thorough investigation. First thing we learned was that motors, like punchpresses and other machines, are not all alike, that for high operating efficiency and lower unit costs, just as much care must be given to their selection.

An analysis brought out the fact that about 41 per cent of our motors were over-powered. Machines and presses driven by 7½- to 10-hp. motors needed, we found, only 3- to 5-hp. motors. Several cases came to light where maintenance costs ran extraordinarily high because of the wrong type of motor.

We replaced the over-powered drives with motors of the proper rating, and the drives that were incorrect with drives designed for the special conditions they were to encounter, such as falling chips, borings, grindings, oils, liquids, heat.

The result was a higher power factor, lower demand charge, and the virtual elimination of production shutdowns caused by drive failure.

Estimated savings in power bills alone will pay for the new motors in less than 16 months. The cost of one of the former shutdowns might easily pay the entire bill.



Many a 10-hp. motor in this plant has now been replaced by a 5. The estimated savings in cost of power will pay for the new motors in less than 16 months

THIS QUICK WAY WON THE $50 AWARD

Better Handling Cuts Time, Ups Output

P. H. KEENEY
Mechanical Engineer, Brock Candy Company, Chattanooga, Tenn.

BEFORE we installed the conveyors in the chocolate-dipping department of our plant, we used one man to catch the chocolate centers, in trays, from the center machine, and another to truck the trays 75 feet to the elevator, drop from third to first floor, then truck 100 feet to the chocolate-coating machine. He would then return with a load of empty trays, usually completing the trip cycle in about 15 minutes.

One girl fed the centers from the trays to the coating machine, and at times during the warmer seasons the centers had to be stored for a time in the cold room for tempering to the correct temperature for chocolate coating. This required handling by a third man, and also overcrowded our cold room. Such conditions often caused spoiled goods and costly production delays.

After we installed conveyors the picture changed completely. We used a chute from the third floor to the ceiling of the first floor, where it discharged on a variable-speed conveyor, which travels along the ceiling through the cold room directly to the chocolate-coating machine. Since the conveyor speed is variable, we can accurately control time in the cold room for tempering centers for coating. Spoilage, delays, and overcrowding in the cold room were effectively done away with.

The conveyors have saved us 18 man-hours per 8-hour day (22 man-hours during warm weather), 8 girl-hours, and approximately 2 hours' use daily of the elevator operator and elevator, which can now be used for other purposes. Production has been increased fully 30 per cent.

THIS QUICK WAY WON THE $25 AWARD

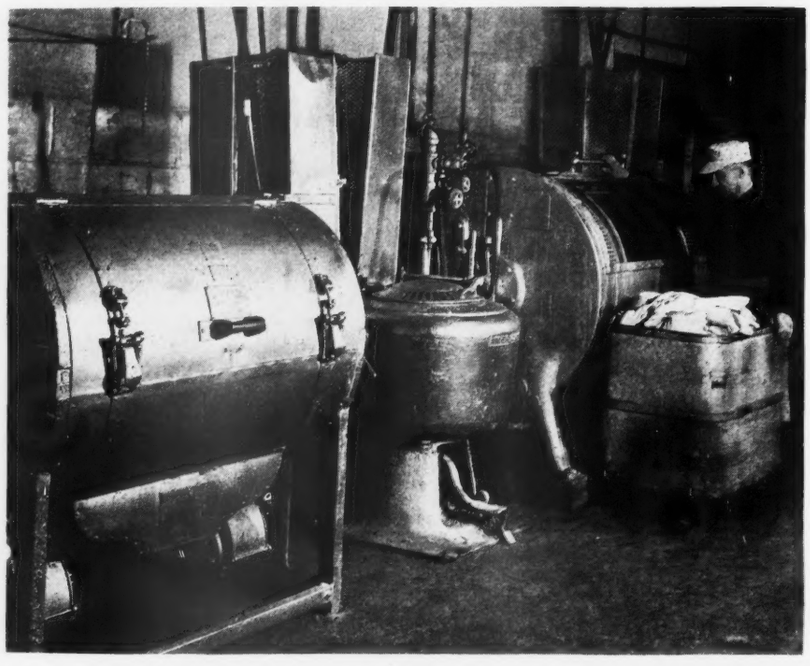
$2,500 Rag Washer Pays Out First Year

WILLIS H. JONES
Master Mechanic, Pratt & Lambert, Incorporated, Buffalo

THERE is always plenty of wiping up to do in a paint and varnish plant if plant and equipment are to be kept in shipshape condition. For many years our bill for colored rags averaged nearly $5,000 per year, plus the expense of carting the used rags out and burning them.

We then installed an electrically driven laundering unit consisting of washer, centrifugal wringer, and drier, at a total cost of $2,500. With one man to operate this equipment, we are able to reclaim all the rags used in the plant.

Last year the cost of washing these rags amounted to $1,800, including labor, electric power, washing solution, and cost of rags purchased to replace shrinkage. The savings in one year were enough to pay the entire cost of the equipment and show a nice profit besides.



This one-man laundering unit (cost $2,500) cut an annual rag bill to $1,800

Materials Handling, Layout and Motion Economy

in the cost-reducing program

EVERY PLANT HAS A HANDLING BILL. The total for all industry runs into astronomical figures. How high, no one knows. But everyone knows that each handling of the product adds to cost of production. Therein lies the importance of handling as economically as possible. And the economical way to handle is with mechanical handling equipment. When industry buys cranes and hoists and trucks and conveyors, it buys lower inventories, quicker deliveries, steady flow of work, improved quality, safe operation. In other words, it buys lower cost of production, higher profit.

Low-cost production demands minimum movement of men as well as materials. The men who successfully operate plants approach this minimum through best possible arrangement of machinery and equipment, and through saving wage-earner time and energy. Best arrangement calls for flexibility, straight-line flow, no backtracking. Wage-earner time and energy are best conserved by making full use of mechanical handling equipment.

Third edge to this combination cost-cutting tool is the search for the "one best way"—call it motion economy, motion-time analysis, work simplification, what you will. So closely is it tied in with handling and layout that if the plant operating man starts with layout, he quickly gets involved with mechanical handling and motion economy. Or if he begins a program of work simplification, he does not get far without bumping into layout and handling. Whichever his approach, the results are reckoned in dollars saved. A dollar saved is a dollar added to profits.

WHAT TO DO

SUGGESTIONS THAT POINT THE WAY

Question every manual handling job in the plant. Consider the possibility of doing it mechanically.

Make sure the right equipment is selected for the job—investigate fully the advantages of conveyors, power trucks and tractors, cranes and hoists, and other types of handling equipment available.

Consider the use of flow diagrams to show the travel of parts and products through the plant.

Investigate the possibility of using straight-line production methods; weigh the advantages of product over process control.

Starting with the premise that about 30 per cent of the operator's motions are waste motions, ask these six questions: *Why* should the work be done? *What* is to be done? *How* is the work to be done? *Who* is to do the work? *Where* is it to be done? *When* is it to be done?

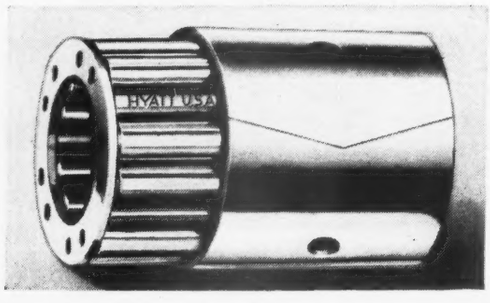
Can we simplify procedures? *Can the operation be eliminated?* If not, *can it be combined with another?* If not, *can the sequence of operations be changed?* If not, *can the operation be simplified?*

Consider the use of idle-time recorders, motion-picture cameras, process charts, micromotion studies.

LANSING
TRAILERS
with their Hyatt equipment, help speed up loading and cut down dockage charges. Everywhere Hyatts are serving and saving.

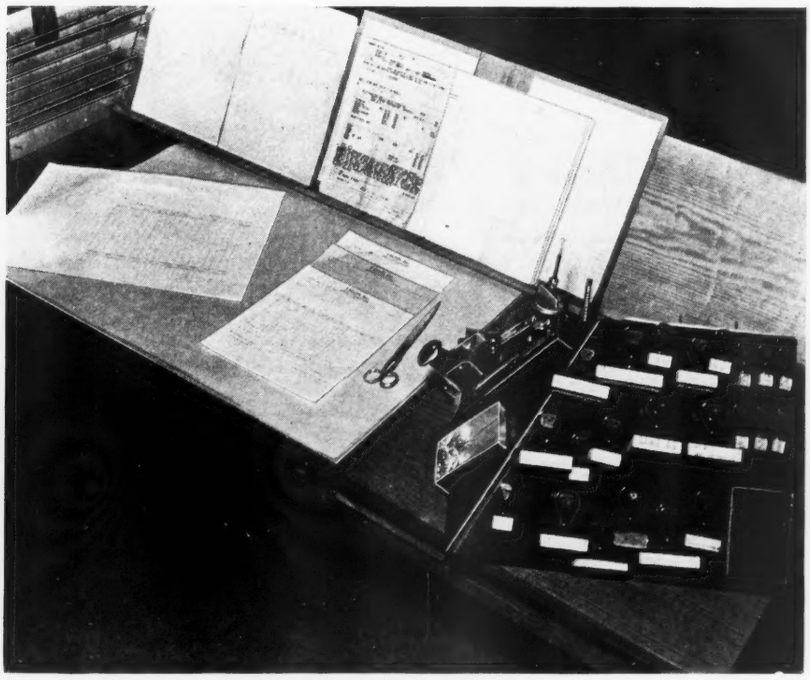
Built In Bearing Security

HYATT ROLLER BEARINGS rotate so smoothly, so accurately, so efficiently that they are called upon to play an essential role in the smooth functioning of all mechanical equipment. Design engineers know from experience that Hyatts on gears, shafts and wheels bring a lifetime of dependable performance to their products. Thus to the builders of mechanical equipment Hyatt offers advantages of design . . . to the purchaser Hyatts bring quiet, carefree, economical operation. Be secure . . . with Hyatt Roller Bearing protection. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Pittsburgh, Detroit, San Francisco.



HYATT ROLLER BEARINGS

*Saving 14 Hours a Day



With motion-economized workplace two men do 24 hours' work in 10 hours' time

Sending out a set of press proofs to the customer may seem like a very minor operation, but on the contrary this seemingly minor operation required some 24 to 36 hours per day.

We then took a picture of the operation as it was being done. You will notice nothing in its proper place—gages, stamps, glue pot, scissors, copy holder, etc., were all over the desk.

Thereupon we conceived the idea of a turntable arrangement with a three-cornered "dog house" on top, and then proceeded to attach such things as the stapler, glue pot, pin and clasp holders, stamps, stamp pad, and pencils. No provision was made for the scissors for the simple reason that they are in almost constant use.

Next a proper fixture was made to hold the copy and front of order. This is a long slanting board placed at the rear of the table within easy reach and readable distance from operator. The copy holder slides forward or backward.

We then placed at the extreme left side of the table a permanent fixture to hold gages.

All tools are now off the table, together with copy and copy holder, and in their proper place, allowing a large area of the table free for the pasting and making up of the proofs proper. The revolving turntable permits easy access to all miscellaneous tools.

This little improvement saves 14 hours per day. By the old method it took 24 hours to produce 18 proof-out orders. With the new set-up the same number of jobs can be completed in 10 hours.—*I. G. Ostendorf,* Layout Department, Standard Register Company, Dayton, Ohio.

**Cuts Cost, Adds Space

In our new truck engine plant the problem of materials handling was solved by straight-line production throughout the plant and three separate chain conveyors, running at right angles to the finish ends of all machine lines. The operator at the last machine in each line placed the finished part on a hook of the moving chain which carried the part through a tunnel-type washing machine (wash, rinse and blow off—all automatic) and then to the inspection tables where parts were removed and placed in storage for delivery to engine assembling lines. This eliminated all trucking between the ends of our 20-odd processing lines and the washing operation, and between washing and inspection, resulting in quite a nice saving not only in labor but also in floor space which otherwise would have had to be used either for aisles or for temporary storage.—*John A. Carraro,* Plant Layout Engineer, International Harvester Company, Indianapolis.

✦

A 45-lb. sling was substituted for a 100-lb. sling in handling quenching baskets in a heat-treating department. One man now does the work of two.

✦

Saves $470,000 the First Year

Big baking concern uses some 70 machines for wrapping cartons of biscuits. Printed cartons were originally used and overwrapped in unprinted transparent material.

Now this company uses an unprinted chipboard carton of cheaper quality which is overwrapped with opaque printed material. The operation is electric-eye controlled.

Savings as reported by the baking concern amount to $1 per thousand cartons. Assuming 70 machines, an average speed of 50 cartons per minute per machine, and 280 working days, the annual savings mount up to the astounding total of $470,000—more than enough to wipe out an initial investment averaging $5,000 per machine in a year's time.

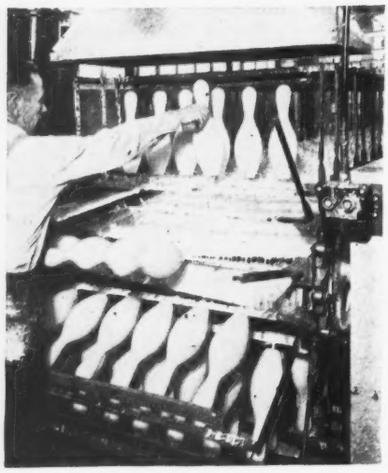
Diesel Crane Cuts Fuel Bill 60%

A typical example of the economies effected by a diesel locomotive crane over a steam crane can best be illustrated by a comparison of the two in the same class of service. The savings below were figured for cranes engaged in magnet work; both handling pig iron in the yard of a large steel producer in the Pittsburgh district; on this work, the 25-ton diesel crane unloads an average of 1,700 tons of pig iron per 8-hour day, in addition to switching out the empty cars:

Fuel saving.....60%
Maintenance and labor saving....33%
Tonnage of materials handled.....40%

In addition the diesel crane is one-man operated, while a fireman is required on the steam crane when engaged in steady work. Delays for steaming-up in the morning, also to take

FAST DRY, LOW COST



New lacquered bowling pins are dried at the rate of 300 per hour instead of at a much lower rate. Difference is due to drying conveyor, which also saves considerable in handling costs. Conveyor speeds can be regulated to suit varying production needs

on coal and water during the day, plus the fact that the steam supply is sufficient for only a short haul in switching service, account for the greater daily output of the diesel crane.

Quadrupled Shop Box Life

Average life of wooden shop boxes in the plant of a manufacturer of photographic supplies was 3 years. And this included frequent time out for repairs. Steel boxes used on the same work and under the same conditions have been in continuous service for 12 years with practically no expense for maintenance.

Downs Package Cost 33%

A plant that exports metal sheets used to use a box with three wide cross cleats top and bottom. Ends and sides were 2 inches thick. The box empty weighed 85 pounds.

This weight was cut to 38½ pounds and a reduction of 21 board feet of lumber was made by using 7/16-in. lumber for top, bottom, and cleats, and 1⅛-in. lumber for ends and sides. The new package is actually stronger than the old one because the ends are reinforced with steel bands nailed to the end cleats. And because a tensioned strap around the box at the center absorbs the shocks caused by the flexibility of the metal sheets at that point.

Besides the obvious saving in freight, the cost of the box was cut 33 per cent.

From Press to Baler to Car at a Profit

Space, time, and dollars are saved by a new scrap-handling system installed by Heinz Manufacturing Co., Philadelphia, producers of automobile bodies and parts.

New equipment consists of specially designed tractor-drawn trailers, a mechanical dumper, and a steel apron conveyor 5 feet wide, 62 feet long. Scrap is loaded into the trucks in the press shop, drawn by tractor to the conveyor, dumped mechanically, and taken to the baling department.

The old way was to take the scrap away from press stations in box trucks

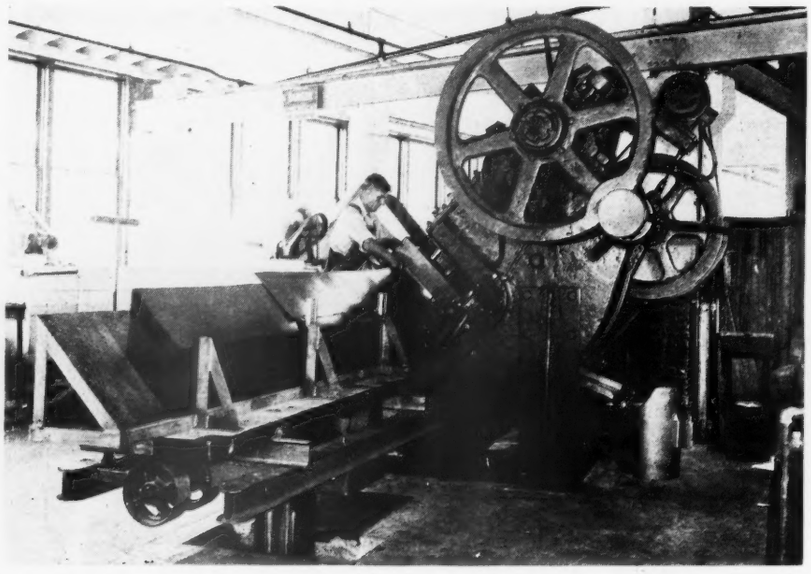
Reduced 9 Handlings to 3

A new truck has been built especially to handle 10-ft. sheets from which stator laminations are punched in the plant of The Reliance Electric & Engineering Company, Cleveland.

It takes three tons of sheets at a time, piled on a floor whose slope corresponds to the angle of tilt of the press plate. This makes unnecessary any additional positioning of the sheets as they are fed between the blanking dies. A combination air-hydraulic lift, over which the loaded truck is run, is used to elevate the sheets to exactly the working level of the press.

The lower edges of the sheets rest against angle-iron uprights over which are fitted freely-sliding sheet guides containing hardened vertical sheet rolls. Preparatory to starting the blanking operations, the operator frees the top sheet by pulling it toward him and letting it slide back against the guides which meanwhile have dropped tightly against the remaining sheets. The top sheet, sliding on knife-edge projections on the guides, has its lower edge raised slightly above the rest of the sheets and its upper edge offset a couple of inches beyond the edge of the sheet pile. The decreased area left in contact with the sheet below and the better hold provided by the projecting edge of the sheet both serve to facilitate the operator's manipulation of the material through the press.

Previous practice had been to shear sheets approximately 10 by 3 feet into 3 by 1 foot sections, feed these into the press from 2-ft. piles. The use of the truck has permitted radical revision of the procedure. For the same size blanks, the 10-ft. sheets are slit into three strips of equal width, loaded on the truck, elevated beside the press as shown here, and fed into it from the same height piles, but with a reduction in number of major handlings from nine to three. The handling time saved amounts to about 50 per cent.



Special truck with combination air-hydraulic lift cut 9 major handling jobs to 3

and let the latter accumulate along the loading platform until there was enough scrap to make up a carload. This practice interfered with making full use of the platform, and the boxes of scrap were unsightly. Also, the scrap was loosely baled and did not bring top prices.

Now the scrap is segregated. Scrap to be sold goes directly to the baler and when baled is ejected automatically through a gravity roller conveyor. This latter conveyor extends above the railroad track, has drop stations at intervals through which the bales fall into a gondola car beneath.

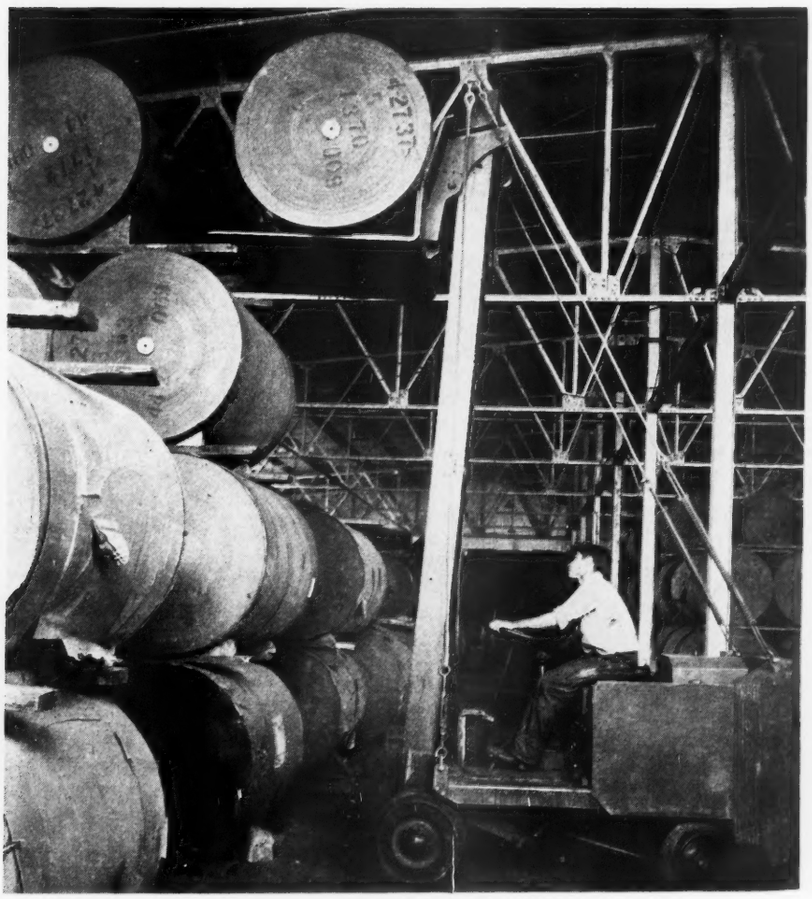
The other class of scrap goes to the salvage department. It is high-quality steel of sufficient dimensions to be worked on, and is used for small specialties like roller skate wheels, screen door hinges, small automotive parts, and parts for toasters, irons, and radios.

All this adds up to a difficult job made easy and more profitable. The entire operation takes up less room. Handling costs have been materially lowered. There is a healthy profit from the scrap that is salvaged. And the scrap that is baled and sold brings better prices than it used to.

With Crane, Handling Cost Is Down 90%

Unloading material by hand in a sheet steel warehouse required the services of 4 to 6 men. It was necessary to remove the sheets from the car, one or two at a time, place them on a truck, and again unload them in the warehouse. The height of the stacks was limited, and it was necessary to provide room around them.

When an overhead traveling crane system was installed, the saving in handling costs ran as high as 90 per cent over the old method. Sheets are now picked up by means of a special grab attached to the hoist, and the hoist then travels from the monorail beam to another traveling crane bridge in the storage bay where the sheets are stacked. Sheets are piled according to size. Bundles up to 5 tons can be handled.



Scoop truck handles paper rolls for 0.034¢ a ton—exclusive of driver's wages

Saves $5,000 First Year

One of the big automobile concerns unloads sheet steel with a high-lift truck (see photograph) equipped with a swivel fork attachment. Three-ton packs of steel can thus be rotated, making it easy for the truck to get through box car doors.

After the truck had been in service a little over a year, the company said it had saved not less than $5,000, or about $20 a car, over hand-unloading methods.

Handles Paper for 0.034c a Ton

At the plant of the Northeastern Container Corporation, Bradford, Pa., as much as 100 tons of corrugated paper and paper board is handled per day. This company formerly used a certain type of lift truck, but found that by changing to a scoop truck it could eliminate the need of building bridges from the truck to the top of the pile, and pushing the rolls by hand over the portable bridge, when stacking rolls of kraft paper.

With the flat scoop truck, the rolls of paper are picked up with a scooping motion, transported to the pile, and dropped in place without the use of bridges or need for manual handling.

During the first eight months the truck was in operation it moved more than 16,000 tons of board at a total cost, exclusive of driver's wages, of 0.034¢ per ton, including original cost of machine, repairs, gas and oil, and allowing 20 per cent depreciation of $600 on a 24-hour operating basis.

✦

On a crane in West Coast plant, life of best of ordinary rope, 11 months. Average life, 3 preformed ropes, 18 months.

✦

*40% Less Handling

We are manufacturers of lamp shades. Our primary operation is the pleating, and from this point on the shade is handled many times. This is the type of product that must be handled very carefully. Stacking is limited, and careless handling in most cases results in absolute loss.

I therefore designed and had con-

structed special trucks that also act as work benches, and I am working on the premise that the fewer times material in process has to be removed from its original carrier, the less "abusive" handling it will receive and the more economically it can be produced. In the past three months I have reduced handling 40 per cent and loss by damage as a result of handling more than 60 per cent. And I am not quite through.

By the former method the work was brought in by truck and dumped on the various work tables, and retrucked from one table to another. Now the combination "work-table-truck" is rolled from one operation to the other, and in addition to the reduction of damaged goods, and more economic production, there is also less confusion, a better and simpler control of the work in process, and, believe it or not, some little conservation of floor space.—*James L. O'Neill*, Plant Superintendent, Amity Lamp Corporation, Garwood, N. J.

Hydraulic lifts at Creamery Package Company solved press-feeding problem, doubled production, and at the same time eliminated worker fatigue

Doubled Output, No Fatigue

In manufacture of milk and ice cream cans at The Creamery Package Company, Arlington, Ill., the nature of the materials handled made the first two operations in the production lines the slowest and most difficult. And as soon as new machines were provided to step up the pace, the element of fatigue entered the picture. Volume was governed entirely by the ability of employees to feed materials into the machines.

To feed these first two machines, it was necessary to pick up sheets weighing up to 20 pounds and place them in position—and at a fairly fast pace.

It was obvious that the operations would be laborious and that machine output would be curtailed unless the sheets were lifted mechanically to working height.

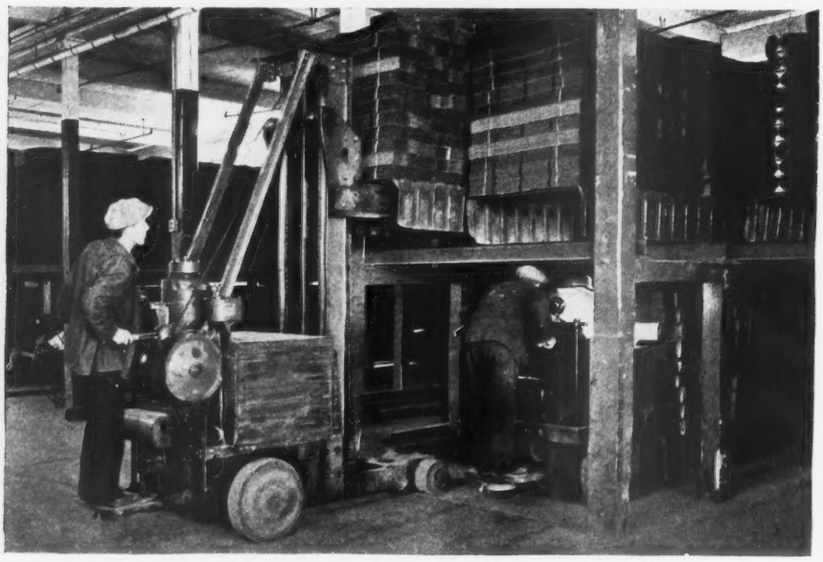
Hydraulic lifts were therefore installed in the floor directly in front of the feeding positions. These lifts have flat tops measuring 3 by 4 feet mounted on hydraulic jacks.

In operation, a lift truck platform loaded with steel sheets weighing from 7,000 to 8,000 pounds is placed on the lift top while the latter is at floor level. The lift is then raised to perfect feeding position.

To reduce operating time and employee fatigue still further, rubber suction cups attached to a vacuum pump are used to lift the 20-lb. sheets into the machines. This procedure has also eliminated the really serious cuts and bruises that were frequent occurrences when the heavy steel sheets were handled manually.

As a result, the problem of maintaining production schedules has been satisfactorily solved. The company estimates that the operating efficiency of the machines would be no more than 50 per cent of the present performance had the labor-saving hydraulic lifts not been installed.

HANDLING COSTS DROP FROM 49c TO 24c



The photograph shows how a manufacturer gains storage space and cuts handling costs through the use of movable I-beams and a power truck. During hand handling days, cars were loaded from storage at a cost of 49c. Use of the electric truck has cut this cost to 24c. And to this very substantial saving add the economy of additional warehousing space at no additional cost

Truck Saves 28c per Ton

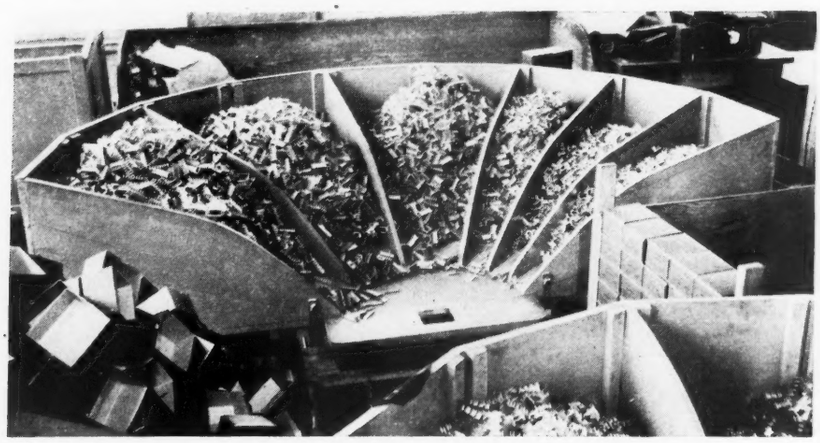
A San Francisco manufacturer of metal products formerly loaded finished bedsprings on carts which were pushed by hand to be loaded on motor trucks or into freight cars. Handling cost on this operation was 42¢ per ton.

Substitution of a skid and power truck system, cut handling time, released labor for other duties. The truck has a minimum height of 11 inches, maximum lift of 16. The truck operator now handles the entire production on skids, loading on motor trucks or freight cars, for 14¢ per ton, a saving of 28¢ per ton.

Pressroom Handling Costs Down 50%

An Ohio casket manufacturer formerly unloaded steel by hand-drawn trucks. This year the company provided its receiving department with 350 skids with side pockets, making them stackable. Incoming material (maximum sheet size 85 by 92 inches) is piled on skids in the freight car, removed by a gas-powered lift truck with a lifting height of 54 inches, placed in

*MOTION-ECONOMIZED BENCH—COSTS OFF 40%



The ordinary flat-top bench long used in packing one of our standard products has recently been replaced by an improved bench with these advantages:

1. Partitions divide bench into compartments; pieces do not become mixed.

2. Partitions are removable; size of compartments can be changed at will.

3. Compartments all converge to actual working space of approximately 30 inches wide by 12 inches deep, eliminating excessive reaching.

4. Compartment bases tilt at 20-deg. angle and are faced with metal; pieces slide automatically toward work station as parts are used.

5. Hole in bench under which box is placed, makes it possible simply to slide pieces from compartments through hole into box.

6. Platform under hole is adjustable to fit boxes of various sizes.

Direct labor costs have now been cut 40 per cent, the operation is much less fatiguing, and operators' earnings have not been reduced.—*Arthur R. Baldwin*, Industrial Engineer, Bristol Company, Waterbury, Conn.

storage, skids tiered six high. Annual tonnage of steel thus handled, about 3,000 tons.

The same truck withdraws steel from storage, serves it to the press department, handles fabricated parts from one process to another, has increased press department productivity 30 per cent, cut pressroom handling costs 50 per cent.

Dust-Tight Conveyors Cut Carburizing Costs

Until recently a motor car manufacturer used conventional handling methods in a carburizing process, encountered an unusual volume of dust and broken particles in the carbon compound. Actual figures showed that as much as three parts new carbon was required to one part old.

The company then installed enclosed, dust-tight conveyor-elevators of the type that moves the carbon between operations in a literally solid mass. This action prevents breakage, eliminates disintegration, and keeps out foreign matter. As a result the manufacturer now requires only one part new carbon to six parts old.

Supplementing the conveyor-elevators, the company installed vibrating coolers which cool the carbon quickly after it leaves the furnaces and minimize the amount of ash formed.

In addition to a big saving in carbon, this manufacturer has increased floor space more than 50 per cent.

✦

Hydraulic drawbridges in a West Virginia pottery elevate kiln cars, lower them automatically, enable ware placers to work always at most convenient height. Labor saving soon paid for the equipment.

*One Man with Crane Does 2-Man Job

When Westinghouse installed its new a.c. motor manufacturing aisle at the East Pittsburgh plant, the problem of packing, storing, and shipping these motors was given much study.

The usual means of shipment is by freight car or motor truck, so the shipping and handling facilities installed were engineered to the requirements. Throughout the entire packing floor, warehouse, and loading platform, the motors are handled by conveyors and overhead cranes.

The loading platform is located in an old building, which was revamped to suit this new activity. In the building were two cab-operated cranes on a common track, one of 10-ton and one of 5-ton capacity. The smaller crane is used most, although both cranes are needed.

Since all motors are crated for shipment, it is a simple operation to pick up the crate with a crane and place it in a truck or car. But regardless of the simplicity, it is a two-man operation with a cab-operated crane.

To overcome this expensive operation, Westinghouse engineers designed a pushbutton, floor-operated control, which permits the crane operator to do his own hooking on as well as operate the crane. The control box follows with the hoist and permits the operator to be within reach of the load at all times.

One man can load trucks or cars as readily as two did formerly with a considerable increase in efficiency. The new control makes the crane easier and safer to operate. There is no mistaking of signals between operators.—*R. W. Mallick*, Plant Layout Engineer, Westinghouse Electric & Manufacturing Co., E. Pittsburgh.

**Special Trucks Cut Shipping Costs

Because of the great variety of materials that enter into the construction of an elevator, standard trucks could not be adapted to carry such items as conduit, cables and rods properly and still make each part accessible. We designed special trucks, therefore, to fit a new system of shipping.

These trucks are double-decked so that all parts for a shipment can be collected and then boxed on the upper deck. Boxes are placed on movable blocks which can be spaced to suit the size of the box.

These trucks are built of structural shapes welded together, with decks and curbing of hardwood. The two rigid and the two swivel casters are 8 inches in diameter, ball bearing, and make it easy for one man to handle a 3000-lb. load.

For local shipments, the various materials are collected in carrier boxes and delivered to the construction site

without repacking or rehandling. The material is divided into groups, according to the procedure followed in erection, and because of the accessibility of the parts on this truck the groups can be shipped as required.

Aisles have been designated for the trucks, and each truck and each aisle is numbered so that trucks always get back in the right position. A black panel is provided on the front of the truck, on which the name and number of the contract is chalked, and next to this is a pocket to carry the shipping manifest. In a stall at the rear of the truck sufficient space is provided for the construction box and whatever additional packing crates are required.

This system of shipping coordinates manufacturing and erection. It eliminates confusion and errors in shipping, it doubles the usable floor space. Our cost of shipping has been reduced 25 to 50 per cent and the elimination of lost time, achieved by proper coordination, has reduced erection costs 15 to 20 per cent.—*Edwin C. Rosenberg*, Chief Engineer, F. Rosenberg Elevator Company, Milwaukee.

Conveyor Changes 2-Man to 1-Man Job

In a Nebraska concern's lumber yard, the railroad sidetrack does not come in under the sheds, so cost of unloading has been quite heavy. To cut this cost down, the company purchased 60 feet of ball-bearing rollers, 18 inches wide, in 10-ft. sections. It cut holes in the back of the lumber shed every 20 feet along the railroad right of way, and purchased two or three standards for the rollers to rest on from the freight car to the shed. From that point into the yard it arranged the studdings with a crosspiece so that the rollers rest on that for the balance of the distance.

This has proved to be a labor-saving, time-saving, and money-saving piece of equipment. The company is now able to unload a car with one man in much less time than two men required previously. It eliminates one handling of the lumber, besides the hauling from car to shed.

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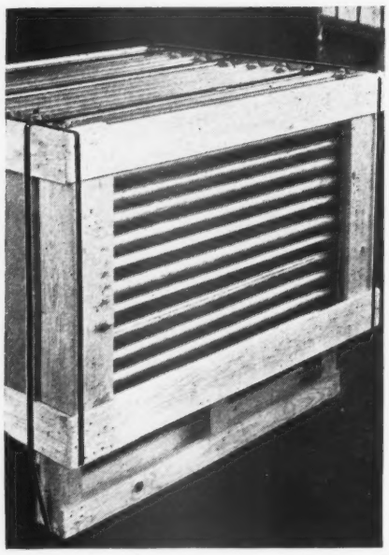
Baking powder concern minimizes handling costs by unpacking raw materials at receiving points, moving them to top floor by truck and elevator, letting gravity do the rest.



Once shipped loose in cars, steel tubes are now strapped on skids. Result: One man with power truck can unload a car in an hour. Labor saving, due to this new method, 98 per cent

Fork Truck and Operator Take On a 7-Man Job

A chemical plant that receives bagged raw chemicals by rail formerly used one man inside the freight car, three hand truckers, one man at a portable belt conveyor, and two men in the warehouse to pile—a total of seven men—in unloading. Loading outgoing material of the same character required a six-man crew.

It has now adopted the system of unit loads, using low-cost, double-faced wood pallets. The unloading operation requires one or two men in the freight car to pile the bags on the pallets. The operator of a fork-type truck picks up the loaded pallets, carries them to the warehouse, tiers them as high as 104 inches.

Also, the company is inducing suppliers to ship materials on pallets, in which case one man with the fork truck handles the entire unloading operation.

The saving in manpower is obvious. Additional savings are obtained through more efficient use of floor space by higher tiering. The accident record is improved because tiered pallet loads automatically provide dunnage, making for more stable piles.

The same machine has cut costs on loading truck shipments. Instead of requiring three men half an hour to load 5 tons of talc in 50-lb. bags on a motor truck, the fork truck does the job in 15 minutes.

Unloading Costs Once $32 Now 52½c

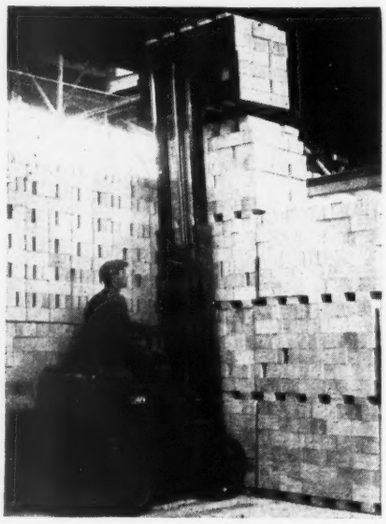
Small steel tubes formed at both ends were formerly shipped loose in freight cars to a certain automobile plant in the Detroit area.

Unloading cost used to be $32 per car. But now the manufacturer places 250 tubes on a skid, straps them with five ¾-in. steel bands which are tensioned and sealed. Result—one man with a power truck can unload a car in less than an hour, at a labor cost of 52½¢, a saving of 98 per cent.

Additional advantages include entire elimination of damage caused by handling, a saving in floor space, plus a reduction in the number of accidents to unloading crews.

Cuts Handling Cost $9,000

A Mid-western brick plant has recently completed extensive experiments with a system of handling brick hacks without pallets. Bricks are unloaded from the kiln car and sorted, the salable bricks being piled in a hack on a simple jig. This method of piling allows for voids on the under side of the hack (pile) to receive the steel fingers



Simple jig makes it possible for fork truck to handle bricks without pallets for estimated yearly saving of $9,000

of a fork lift truck. On top of each hack five rows of brick are placed, presenting the same top appearance as the jig. This allows hacks to be tiered one on another, without pallets, the jig remaining at the original loading point. Careful piling of the hack insures its

Short gravity roller sections in Ohio shoe factory tie individual lasting operations into compact production unit.

✦

remaining a unit even if moved and set down several times from kiln car to delivery truck.

A hack consists of 345 bricks, weighs 2,760 pounds. Cost of handling bricks by the old hand method, with labor at 54¢ per hour, ran $1.284 per thousand brick. Labor cost of the new method runs $0.752 per thousand, a saving in labor of $0.532 per thousand, or $930 per month on that portion of the plant's output capable of being handled in this way (1,750,000 bricks). Estimated yearly saving in labor is $11,160, against which must be charged operating cost of the power truck, depreciation, and interest on the investment. These last three items total $2,142 annually, which leaves the handsome net yearly reduction of $9,018 in the cost of handling the product.

New Crate Saves $2 per Valve

By redesigning its crates one company is saving $2 per valve—and is selling more valves in the bargain. There is also a sizable saving in freight charges.

Valves were previously boxed with heavy lumber, each valve held in position with wooden blocks bolted to the side of the box.

The newly designed crate is made of much lighter material braced and reinforced with steel straps. Consignees report that valves are arriving in better condition.

*Doubled Oven Output

Finding ourselves a bit rushed in our japan dipping and baking department, we sought means of increasing our production without any great expenditure. Our previous process was something as follows:

Dip enough work for one complete oven.....	1½ hours
Allowed to drip.....	½
Baked	1
Removed from oven....	½
Total time.....	3½ hours

We were thus limited to two full ovens per day. It occurred to us that, if we could arrange some way of dipping the next load while the first one was baking, we could fill up another one just as soon as we had removed the work from the first, and in that way could no doubt increase the amount of production from the oven. A truck was therefore designed and built, whose inside dimensions are exactly the same as the bake oven.

Now, while one load is baking the next load is being dipped and placed into this truck. By the time the first load in the oven is completely baked and has been removed, this second load had been completely dipped and the excess paint has already dripped off, so that it is just a question of transferring the work from the truck to the oven.

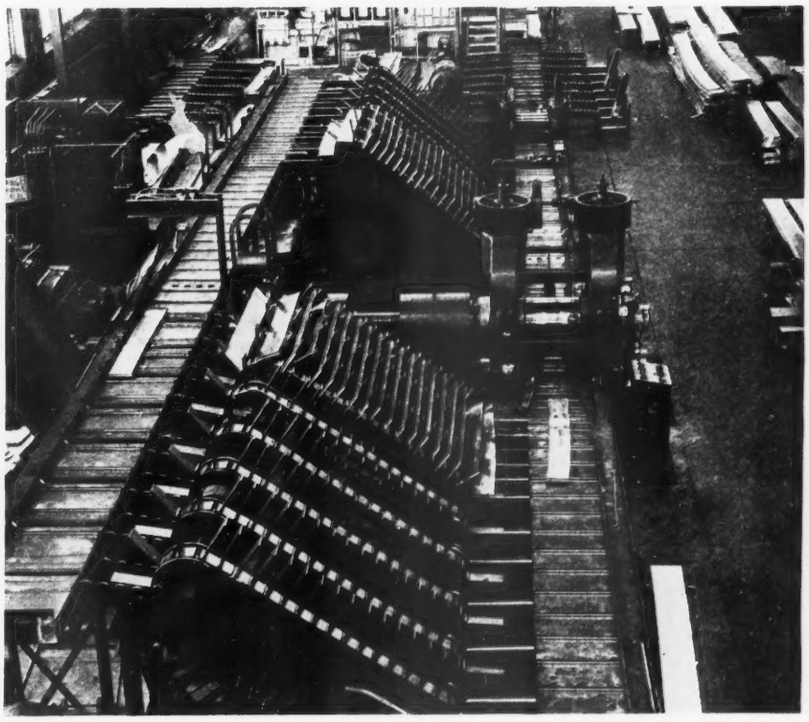
As a result we get four full oven loads a day in place of the two that we were limited to before. The only expenditure necessary was the cost of the truck, which was nominal. There has been no increase in the cost of labor or material, but production has been doubled.—*J. M. Robins,* General Manager, Yankee Metal Products Corporation, Norwalk, Conn.

Cuts Handling Cost 66%

In a large automobile plant the important operation of handling packs of sheet steel was stepped up 40 per cent, or from 500 tons handled in an 8-hour shift to 700 tons, by the use of braided wire rope slings.

In another instance the use of these slings reduced handling time 66 per cent. That is, the same tonnage is now being handled in 8 hours that formerly required 24 hours. The average life of

UPS OUTPUT, IMPROVES QUALITY, LOWERS COST



Planned to facilitate handling and flow of material all the way from the first breakdown pass to packing and shipping, the new brass mill of Revere Copper & Brass, Incorporated, at Rome, N. Y., can produce 2,000,000, pounds of metal a month within a ground area of 72,000 square feet—a ratio perhaps never before approached in the industry. Wherever possible, standard mill equipment has been fitted into the picture, but where a bottleneck was encountered which hitherto has slowed up operations, and which no known equipment could eliminate, Revere engineers found a way to abolish it. Example of specially developed equipment that contributes much to the smooth, unhurried, yet rapid flow of production is the double-decked "escalator" conveyor system shown in the above photograph. On it bars are automatically fed and returned to be fed again into the breakdown mill, each sequence being automatically controlled by a series of electric eyes

the slings on these jobs ranges between 64 and 80 hours.

Assuming the life to be 64 hours, a braided sling is now handling as much steel in eight 8-hour shifts as was formerly handled in 24 shifts, or 192 hours. Hence the saving in time is 128 hours. At the rate of $3 per hour for a crew of five men, a sling will produce a saving of $384 in labor cost alone.

Five Men Load 100 Cars

At Muncie, Ind., the Ball Brothers Company makes mason jars in 36 different sizes. These glass jars are packed in cases weighing from 6 to 34 pounds, and stacked 40 feet high in sixteen large warehouses.

Loading this number and variety of cases into freight cars had always been a serious problem, for it required 12 men to load only 5 cars per day by the truck-and-hand method. It was almost an impossibility for the department to keep abreast of production without materially increasing its man-power.

Then the idea of portable belt conveyors was conceived.

Six complete horizontal and adjustable belt conveyor units were installed to transport the cases from any height on the stacks down and into the cars. Each unit consists of three horizontal portable belt conveyors mounted on rubber-tired casters, one conveyor section 10 feet long and the other two 16 feet long. At both ends of these sections portable adjustable belt boosters are connected that can easily be raised by a hand winch to any height up to a 27-deg. slope.

At the feed end of the conveyor, the operator loads the cases on the declining belt as he works down through the stack. At the unloading end, the cases again travel on another booster that carries them up and into the freight cars. Here another operator removes the cases and piles them in the car. A canvas covering is provided on this booster to protect the cases from the elements. The speed of these belts is 200 feet per minute, and the drives and take-ups are enclosed in the center of each section, thus making a simple and compact machine.

With these conveyor units Ball Brothers can now load 100 cars per day with only 5 men. The savings in time, energy, and money plus improved working conditions are obvious. It can readily be seen that with 7 less men they can now load 95 more freight cars with these six portable conveyor units.

✦

Automatic Lift Saves $2,300

Motion-economized workplace for clipping job upped a brassiere plant's output, added 25 per cent to girls' pay checks.

✦

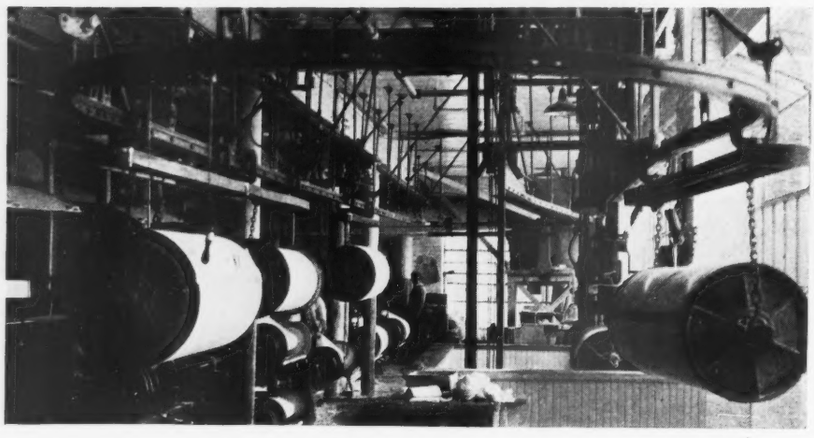
When production in a textile mill reached the point where 400 warp beams were transferred daily from the slashers on the second floor to the tying-in room on the first floor, it was found necessary to install automatic lifts which operate from gravity-feed monorail loops.

Beams are taken from the slashers by an electric hoist on an independent monorail track and loaded on special carriers which roll around the loop to the feed-on mechanism of the down transfer. When a carrier passes on the lift section it throws a safety latch, stopping the next carrier and at the same time setting in motion the lift mechanism which lowers it to the first floor. Here the section engages with another gravity-type monorail loop, permitting the carrier to roll off automatically. The carrier in passage again actuates the lift mechanism, returning the section to the second floor to receive another warp beam.

Operation of the up lift is exactly the reverse, so that empty carriers are returned automatically to the slasher room above.

With this system in operation, the necessity of replacing a worn-out freight elevator was eliminated. Release of the former day and night operators for other work resulted in an annual saving of $2,340.

Another worth-while saving came about through the great reduction in floor maintenance. The former method of handling beams on dollies imposed such severe service on the wooden floors that frequent repairs and replacements were necessary.



Beams are transferred from monorail via automatic lift, saving $2,300 a year

*Saved 20% First Year

Portable conveyors in our sugar warehouses have given us a labor-saving return of 20 per cent on our investment the first year of operation.

Our warehouses are built adjoining one another in a straight line, 463 feet long by 72 feet wide. There are 500 feet of portable conveyors in units of 10, 20, and 30 feet. In addition to these portable conveyors, we have two portable bag stackers with a piling height of 30 feet above floor level. The conveyor units and stackers are individually powered so that they may be used separately or collectively to carry sugar from the sacking stations to the extreme corners of the warehouse.

In our former method of handling, the sugar was taken from the sacking station by hand trucks of 5 to 8 bags each or on trailers of 25 to 30 bags each. In either case the bags were loaded by hand, hauled to their destination in either the warehouse or boxcar, and there unloaded by hand. The hand trucks and truck trailers returned empty for another load.

With the new installation in operation the bag closer merely tips the bag on the first conveyor, and it goes to its destination with no more handling except by the workmen at the end of the line. Seven to nine men's work is saved. We have also found

that reducing the number of times a container is man-handled eliminates that many chances of the container becoming soiled or torn.—*Fred L. Hull*, Sugar Boiler, The Great Western Sugar Company, Loveland, Colo.

*Upped Production 20%

An investigation of a light foot-press assembly operation in one of those departments in which "everything has been going all right for the last twenty years" revealed many deficiencies.

To overcome these faults, the follow-steps were taken:

1. The department was laid out so that all parts used were stored within the department rather than scattered all over the plant. Parts were stored as near as possible to most probable location for use, and work areas were placed in line of logical progress.

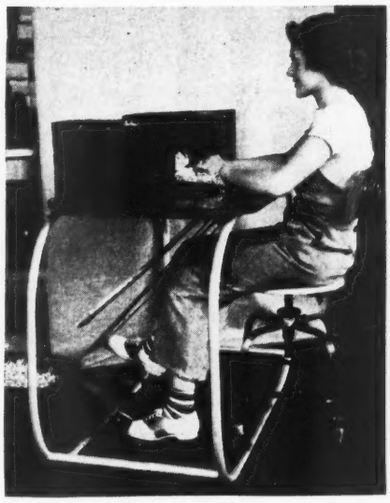
2. Production orders were adjusted so as to be completed in multiples of 4 hours. A daily schedule was made up, and given to the materials handling man. This man's hours were advanced so that he could spend an hour before regular working hours and the regular lunch hour setting up materials. All setting up was done in this time. The 6 hours saved were spent in a different department.

3. Special combination work tables and foot presses were designed with the following features:

a. Provision for storage of half day's supply of parts.

b. Mobility—the tables may be easily slid on the runner-like base to storage area for loading, or into whichever work area they are needed.

c. Central convenient location of parts on work table.



With combination table-press, footwork is better, production is up 20 per cent

d. Drop delivery of finished part.

e. Elbow rest for operator—natural arm movement, pivoting from elbow.

f. Two foot pedals pivoting at arch of foot. This eliminates lifting the weight of leg on each motion, and makes it possible for operator to use either or both feet.

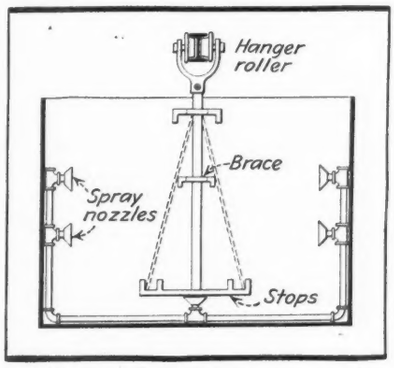
Besides the obvious saving in materials handling time, these three steps resulted in a 20 per cent increase in production of assembled parts.—*Edwin H. Schaeffer*, Industrial Engineer, J. E. Ogden Co., Bayonne, N. J.

*For $65, $260 a Month

A change in product design made it necessary for us to put a large panel of plywood through a paint-spray operation on a conveyor that was originally intended to handle small parts. This conveyor takes one hour to complete the cycle through paint spray and ovens, and with the large-sized panel required twice as many men to load and unload with half the production.

The problem was to design a hanger that would take two panels, allow the spray to reach both sides, be adapted to both large and small panels, and not require additional labor.

After several tries, one of our maintenance men designed a satisfactory hanger (see sketch) that saves $13 a day in direct labor and doubles paint-spray unit's production. In short, an expenditure of $65 saves $260 a month.—*O. F. Long*, Maintenance Superintendent, Fisher-Tennessee Division, General Motors Corporation, Memphis.



A $65 expenditure for hangers makes it easy to double spray-booth output

*Labor Cost Down 35%

An analysis was made of our materials handling problem and the following conditions were found:

1. Large variation in size of materials and parts to be handled, both in process and on the assembly line.

2. Insufficient equipment to provide temporary storage for parts and sub-assemblies until all parts were ready for assembly. In many instances much time was lost looking for finished parts that were in temporary storage.

3. It was impractical to have one cumulation point for all parts, sub-assemblies, and purchased items because of the floor space required.

4. The assembly line was too short to store all parts and sub-assemblies at the point where they were to be assembled, thus necessitating much lost motion.

There were two alternatives: One was to build an extension on the plant and provide more of the same type of materials handling equipment (dollies and boxes) in use at that time. The other was to design some equipment flexible enough to meet all the requirements as nearly as possible, and simple enough to be made without interfering with regular production. The latter was decided upon and experimented with in the production of small implements.

The equipment consists of stack boxes, small stack racks, large stack racks (light material), large stack racks (heavy material), board for the floors of the racks when used as skids, board for the sides of the racks when used as boxes.

Results obtained thus far: (1) Labor cost reduced 35 per cent; (2) equipment cost reduced 60 per cent; (3) floor space required reduced to 50 per cent of what normally had been required; (4) outlet provided for second-grade lumber from wood shop; (5) plant appearance 100 per cent neater.—*C. P. Pittman*, Assistant Engineer, Lilliston Implement Company, Albany, Ga.

*New Layout Reduces Core-Making Costs

A few months ago we realized that some drastic changes must be made in our core-making department to handle increased output. A process chart and layout diagram opened our eyes to improvements possible:

1. A man was wheeling the most

commonly used sand from a bin located five bins from the muller, a total of 5 miles per day. By changing the sand to the adjacent bin, closing the original doorway, and opening one right at the mixer hopper, we not only cut the carrying distance to 15 feet per load, but also increased the bin's capacity by one carload. The barrow had been filled by measuring pails, and three or four trips made for each mix. We built up the barrow to hold exactly one-half of the total mix. When full, the barrow is struck off, giving the exact measure.

2. Room was needed for two new core roll-over machines. The layout diagram showed the spacing distance between machines varied with the size of the sand box. A standard box was made, narrower, longer, and deeper than the original, and the new layout with short machine centers gave room for the extra machines.

3. Core-pasting tables were against a solid wall. Cores were stored on truck racks. By moving the pasting tables and placing permanent wall racks, we made several truck racks available for work-in-process that were previously used for storage. The new position of the tables gives the workers more daylight, cuts down lighting expense, and allows greater manipulation of work.

4. Two assembly runs were being used for a production core assembly. The space between them was used for cleaning. Set-down space was at a premium. By placing a run in the center we increased the output by one-half. Decreasing the number of assemblies on the run at one time made it possible to shorten the runs, giving a greater set-down area. The cleaning is now done at the head of each run.

5. In gluing some of our cores, it was necessary to dry the glue in ovens to keep up with core demand. A fast-drying glue frees oven space and racks, also cuts out 60 feet of core travel.—*Guy C. Close, Jr.*, Time Study Foreman, United States Aluminum Company, Fairfield, Conn.

*No Tie-Ups on This Dock

In the building we used to occupy, we found that most of our tie-ups were caused by a very unsatisfactory shipping dock. It was too low, not large enough, and was located in a narrow alley. With this bad past experience we decided to make the dock in our new building an ideal one.

First, we took care of the alley—we have a standard 17-ft. alley used only by us, which runs down the side of our building to the shipping dock. Directly in front of the dock is an area of 4,000 square feet, which we use for a turn-around and which is large enough to enable several large transport trucks to maneuver and unload at the same time.

There are facilities for loading and unloading three trucks at the same time. The dock itself has two large doors—one a wooden folding door, the other an automatic steel rolling door which is electrically operated. The dock directly in back of the wooden door is concrete in construction and is the height of the bed of a standard truck. The dock in back of the steel rolling door is ground level, and a truck can be driven into the dock itself to unload and park for the night. However, we have this filled in with a removable wooden platform, which makes the entire dock the same height.

The outstanding thing about our new arrangement is a freight elevator arrangement. We have an elevator large enough to haul a 1½-ton truck, and it operates from the basement to the sixth floor. There is a steel sliding door on the alley, which opens directly into the elevator shaft.—*William P. Harsh*, Hall Brothers, Incorporated, Kansas City Mo.

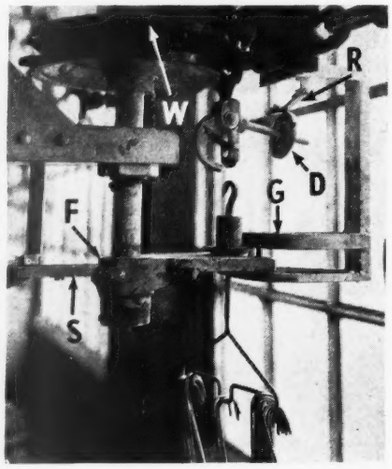
*Automatic Dispatching Cuts Plating Costs

The problem of handling a great variety of telephone piece parts in our plating shop was a most perplexing one. Several attempts to improve the routing to and from the plating vats proved unsuccessful, so it was finally decided to tear down the old installation and to put in a new one organized along more rational lines.

In the new layout the possibility of using fully automatic equipment was eliminated from the start, owing to the great number of different finishes employed. Instead, part of the existing equipment was overhauled and transformed, and the rest scrapped and replaced by more efficient equipment. The whole was laid out in a progressive way along an overhead conveyor.

Much thought was given to proper organization of the centralized feeding point with its dispatching post, which later on became the tempo-giving organ of the whole shop activity. There all incoming parts are sorted, identified, submitted to preliminary cleaning operations, and, after being wired or hooked to special plating attachments, are suspended on collapsible hooks of the conveyor. Arrived at their destination, the parts are automatically taken off the conveyor and brought within easy reach of the operators.

The inexpensive taking-off device as shown in the photograph consists of a chain-driven wheel (*W*) and fork (*F*) mounted on the same shaft and placed on one side of the conveyor, and the stop rail (*R*) and guide (*G*) on the other side. In order to take off the parts at a given point, the adjustable disk (*D*) mounted on the collapsible hook is set in plane with the corresponding stop rail (*R*) which opens the hook by pressing down the disk. The parts are picked up by the rotating fork (*F*), transferred to an inclined rail (*S*), and slide down close to the operator.



This automatic take-off played an important role in cutting plating costs

This working system, now for several years in operation, has made it possible to:

1. Reduce considerably and better control the work in process.
2. Reduce manufacturing times and labor expenses.
3. Relieve the plating operators from all chasing and unnecessary handling of parts, leaving them free to watch the plating process more closely—which in turn has resulted in a highly improved plating quality as well as in appreciable savings in plating liquids, anode metals and plating current.—*M. I. Katzner*, Radio Shop Superintendent, Le Materiel Telephonique, Boulogne s/S, France.

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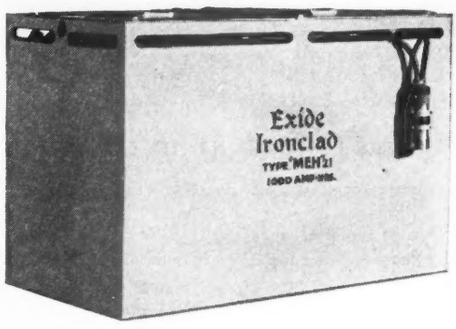

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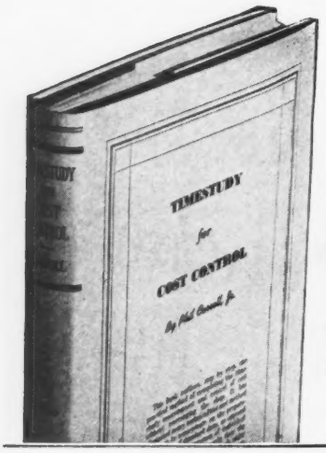

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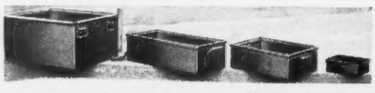

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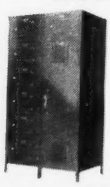

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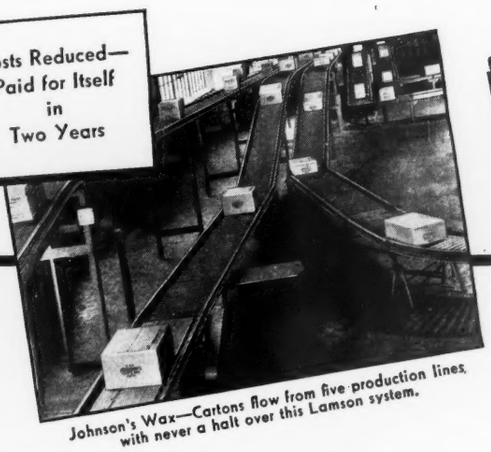

Johnson's Wax—Cartons flow from five production lines with never a halt over this Lamson system.

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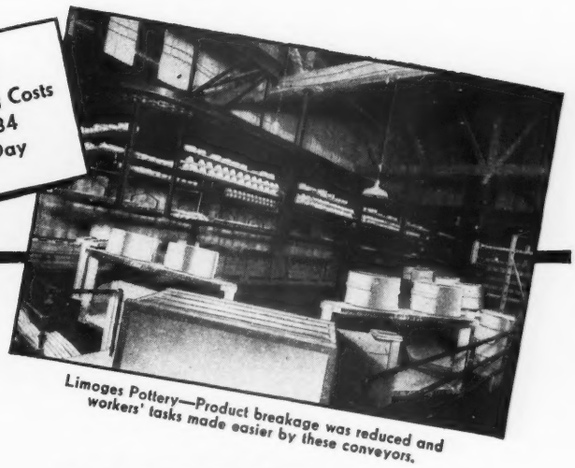
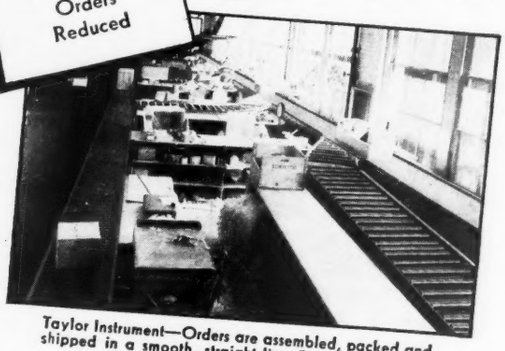


Limoges Pottery—Product breakage was reduced and workers' tasks made easier by these conveyors.

Cost of Handling Orders Reduced



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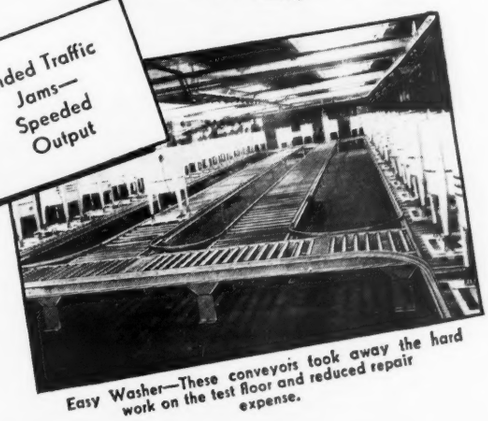

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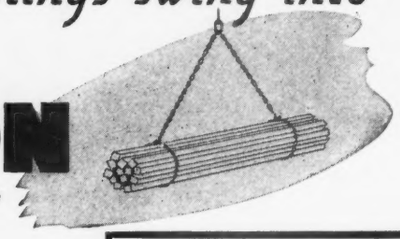

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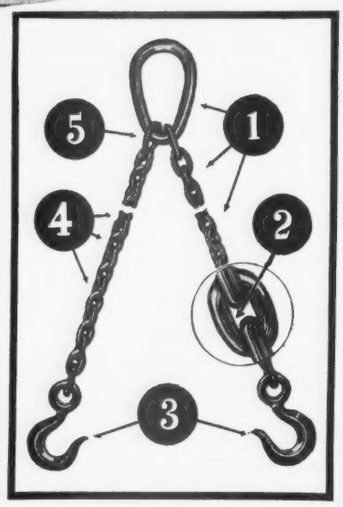

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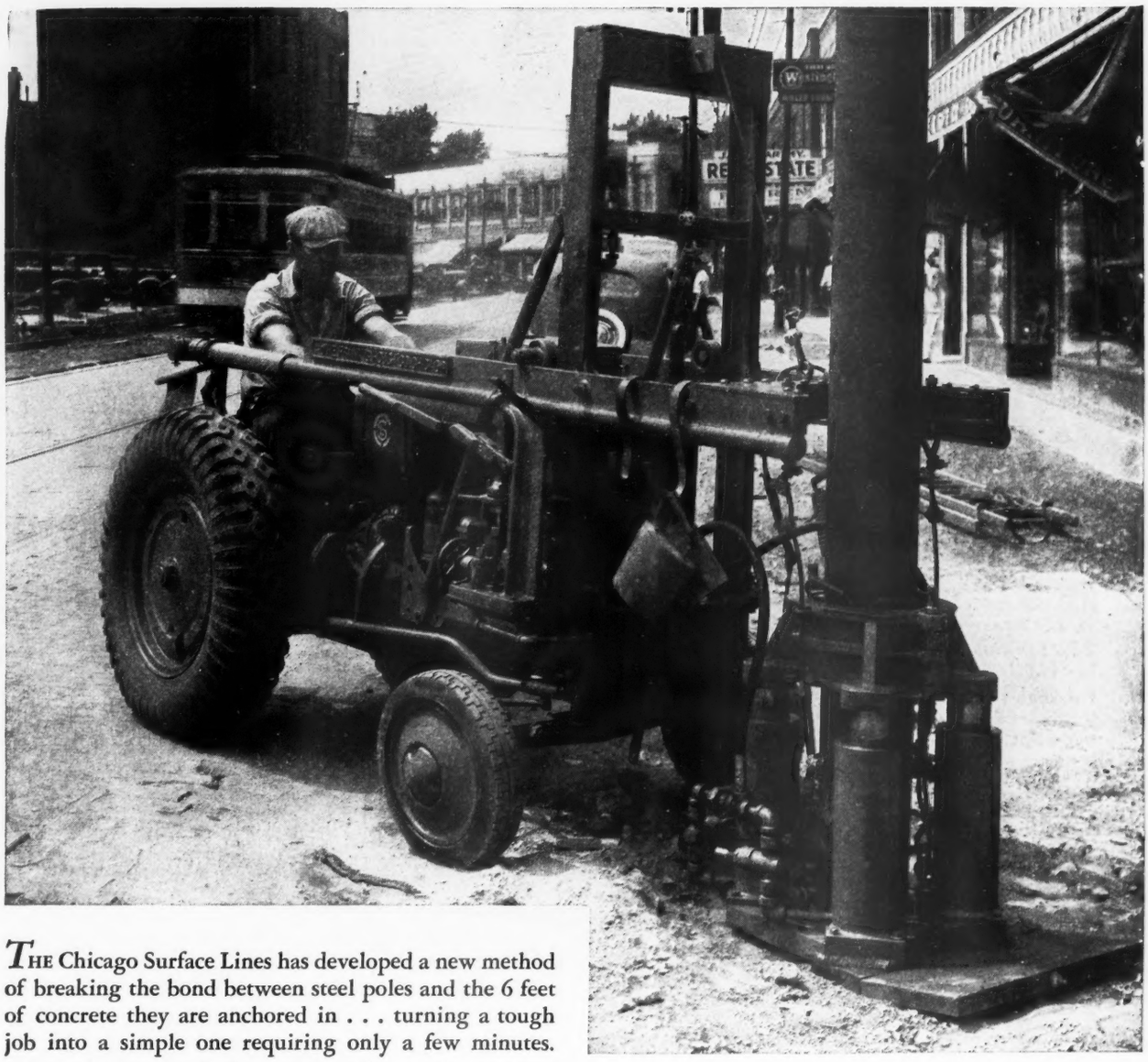
330 W. 42nd STREET NEW YORK N. Y.

. . . Complete Lists Covering Industry's Major Markets

A NEW, FAST, LOW-COST WAY TO REMOVE STEEL POWER-LINE POLES FROM CONCRETE



THE Chicago Surface Lines has developed a new method of breaking the bond between steel poles and the 6 feet of concrete they are anchored in . . . turning a tough job into a simple one requiring only a few minutes.

Four hydraulic jacks and a collar, and a central hydraulic pump, are mounted on an International I-14 Tractor. The tractor is driven up to the pole, the collar opened and the jacks lowered to the ground. The collar is then locked and wedges set between it and the pole. Pressure of approximately 160 tons can be built up by the hydraulic pump, although that much pressure is rarely needed. When the bond is broken, the unit is uncoupled and the tractor quickly driven to the next pole.

The collar has been used for some time with journal jacks. Four men manned the jacks but it was impossible to apply equal pressure all around. The International Tractor has permitted the use of a central hydraulic pump and the heavier-type hydraulic jacks, and has eliminated unloading and loading of the collar and jacks at each pole. It has made a compact, mobile combination that has materially reduced costs. This is typical of the jobs International tractors are called on to do. New uses for their versatility are turning up all the time. Ask the nearby International industrial power dealer or Company-owned branch for information on their ability to solve problems for you.

INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
180 North Michigan Avenue **Chicago, Illinois**

INTERNATIONAL HARVESTER

For "Set" Locations

use the

BOLT SUSPENSION TYPE

A-E-CO LO-HED HOIST

When — 1. Loads must be simply raised and lowered, not moved along a path. 2. Special trollies for various monorail systems are necessary—

The *bolt suspension type* (without trolley) A-E-CO Lo-Hed Hoist is the sensible one to use.

For high-lights of this hoist see A-E-CO POINTS (below). For full details of Lo-Hed hoists, send for our new catalog today.

A-E-CO POINTS

- Lo-Heds range from 1/4 to 12 ton capacities (above type available from 1/4 to 12 tons).
- Operates on Standard I-beam or track of any other hoist.
- Safe, fool-proof.
- Compact, strong, simply constructed.
- Protected against dust, moisture, fumes.
- Heavy duty, ball-bearing HOIST motor.
- Automatic lowering brake.
- Ball or roller bearings at vital points.
- Improved plow-steel cable.
- 100% positive automatic stop.
- Efficient spur-gear drive . . . and

LO-HED COSTS LESS PER LIFT

AMERICAN ENGINEERING COMPANY

A-E-CO Lo-Hed HOISTS

2426 ARAMINGO AVENUE, PHILADELPHIA, PA.

OTHER A-E-CO PRODUCTS: TAYLOR STOKERS MARINE DECK AUXILIARIES • HELE-SHAW FLUID POWER

Save up to 66%

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Send for Bulletin C-1

MECHANICAL HANDLING SYSTEMS, INC.

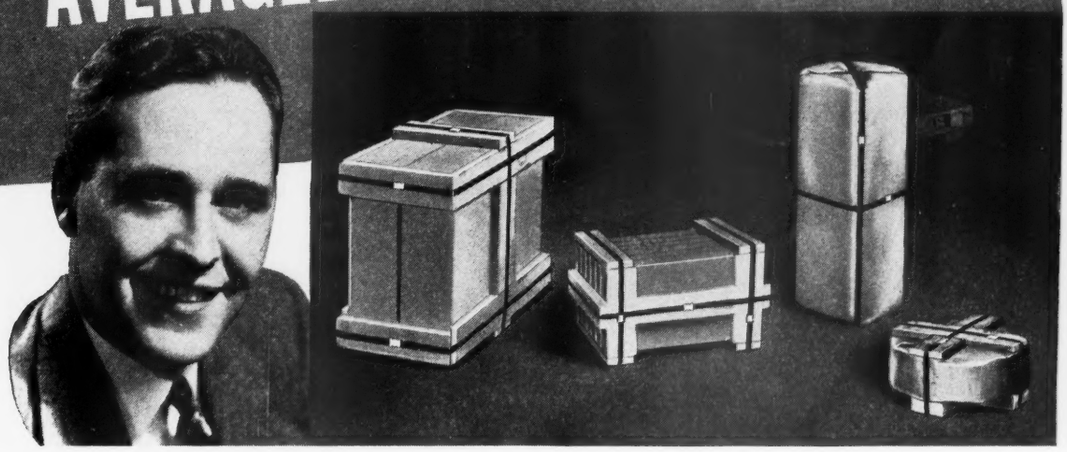
4610 Nancy Ave. Detroit, Michigan

Use the Coupons

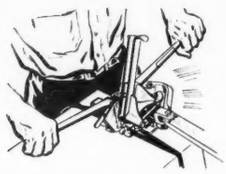
Many advertisers in this issue of FACTORY have not only given you valuable information in their advertisements, but have made it easy for you to get even more detailed data on products and services that can save you money—by inserting coupons in their advertisements requiring only your name and address. Other manufacturers have made valuable catalogs available to you through the Catalog Service Pages found in every section of this issue.

Use them. Tap the valuable information thus easily made available to you.

"COST REDUCTIONS *After Production* AVERAGED 20c PER UNIT—



When Acme Steelstrap, Seals and Tools Were Used"



Manufacturers in every industry are stopping profit leaks beyond their production lines—by utilizing Acme Steelstrap, seals and equipment *correctly.*

For example, the savings, in material, labor and transportation costs, for the shipments illustrated above, average 20 cents per unit. Reductions in tare weight average 15 lbs. per package. (The smallest reduction amounted to 65%.) And in addition, damage claims were eliminated by this simple, easy Acme method of making shipments "Bound to Get There."

The chances are 10 to 1 that you, too, can make important savings by using Acme Steelstrap and equipment in your packing and shipping department. Practically every type of product—whether shipped in cartons, boxes, crates, bundles, skids or in carload lots—can be made ready and shipped faster, safer and more economically with Acme equipment.

The new "Strapbook" gives many "before and after" comparisons and illustrates numerous methods in which Steelstrap is being used effectively. Let us send you a copy—it may help you lower costs *after production has been completed.* Just mail the coupon—there is no obligation.

ACME STEEL COMPANY
2831 ARCHER AVENUE, CHICAGO, ILLINOIS
Branch Offices in All Principal Cities

Acme Steelstraps
FOR MAKING SHIPMENTS
Bound to Get There

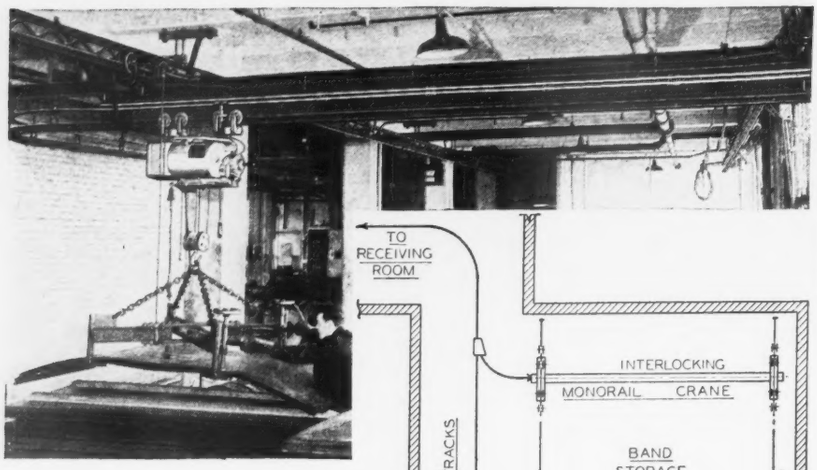
ACME STEEL COMPANY
2831 Archer Avenue, Chicago, Illinois
☐ Send the new "Strapbook"
☐ Have the nearest Acme engineer call.

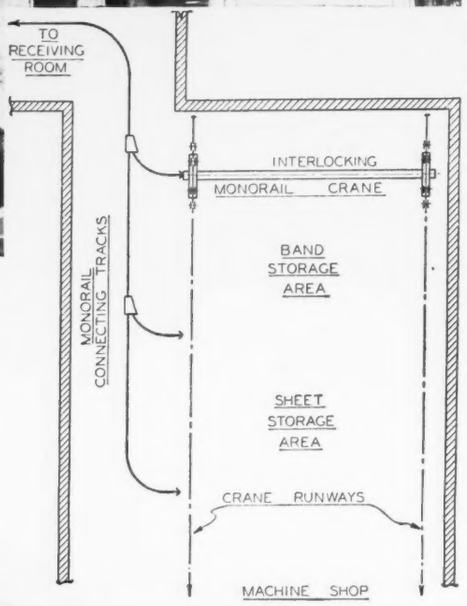
Name.....

Address.....

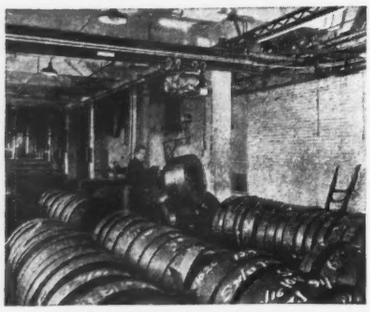
City.....*State*.....

Low-cost Handling System!

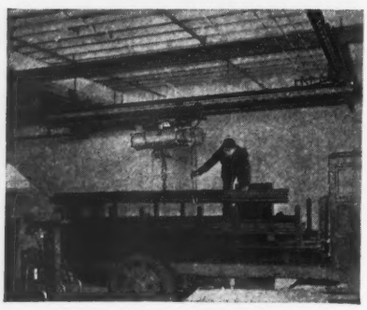




Steel moves from receiving dock to storage over this simple American MonoRail system at low handling cost.



Coordinated system assures one-man control of entire stock.



Steel moves safely from truck to stock with no rehandling.

Since no two overhead handling problems are alike, low-cost solutions are found only in a system that offers extreme flexibility of basic design.

American MonoRail equipment meets varying requirements at low initial cost because standard parts of such flexible design are fabricated into special units and coordinated into systems guaranteed to produce the results intended.

For either manual, electric or automatic operation these systems invariably overcome operating congestion, eliminate costly maintenance and reduce handling expense wherever applied. Engineering consultation is available without obligation.

A 254 page book used as a technical reference for all data covering Mono-Rail Equipment will be sent on letterhead request.

AMERICAN MONORAIL CO.

13114 Athens Ave., Cleveland, O.

How "Better Handling Betters Profit"

For more than 20 years, FACTORY's editors have been telling readers how better Materials Handling equipment can pay for itself in improved efficiency and reduced labor costs. Here are some of the articles which appeared in previous issues this year:

Conveyor Paid Out In Two Years—October 1939 issue

Skid Box Doubles as Hopper—September 1939 issue

Better Handling Betters Profit—July 1939 issue

Give Good Layout Good Handling—June 1939 issue

Untouched By Human Hands—May 1939 issue

Changes Layout Twice A Day—March 1939 issue

All In the Business of Handling—March 1939 (Picture spread)

Month After Month

FACTORY

Brings You Practical Ideas On How

"Better Handling Betters Profit"

IF THE modern electric industrial truck could be connected directly to your power lines, and power supplied from your own power plant or central station, your power costs would be at a minimum, and operating performance would be at its best.

Obviously this cannot be done, and either "live" power generated on the truck by a READY-POWER Unit, or "stored" power from storage batteries with their accompanying spare batteries, battery charging room, motor generator set, charging panel, etc., must be used to move your trucks.

With "READY-POWER"—a generating plant on each truck—your trucks can operate twenty-four hours per day, seven days a week. Truck speed is maintained and maximum tonnage is handled every hour throughout the day. With ample unfailing power, truck operators do not have to conserve power to finish out their shifts—they do more work and like it!

With "stored" power your trucks will operate only a limited number of hours before batteries must be changed. During discharge your trucks slow up and only for the first few hours of operation are they at their best efficiency.

Operating costs compare favorably with batteries — initial investment is ordinarily lower. READY-POWER is 10-year power—good for the life of the truck. Repair part cost average is considerably less than 5 per cent per unit per year.

READY-POWER Industrial Truck power plants are applicable to practically all electric trucks now battery-operated. The change over to "live" power can be made in a few hours' time in your own shop. New trucks READY-POWER-equipped will be gladly supplied by all the electric truck manufacturers.

Secure maximum performances for each dollar of truck investment and for each wage dollar with READY-POWER.

Write us or contact our district representatives for complete information and bulletins.

The READY-POWER Co.

3826 GRAND RIVER AVENUE • DETROIT, MICHIGAN, U. S. A.

Which Crane for Your Work?

THE ONE THAT WILL EARN THE GREATEST PROFIT!

Sixty years ago Industrial Brownhoist built only one type of crane. Today, we manufacture over forty standard types and sizes, up to 200 tons capacity. Why is this necessary? The reason is simply that to effect maximum savings a crane must be right for its work.

In building the world's most complete line of locomotive cranes we are able, without prejudice, to recommend the machine best fitted to your handling job. Why not let one of our sales engineers study your work and plant layout? He can quickly tell you just what results you can expect from a modern Industrial Brownhoist.

INDUSTRIAL BROWNHOIST

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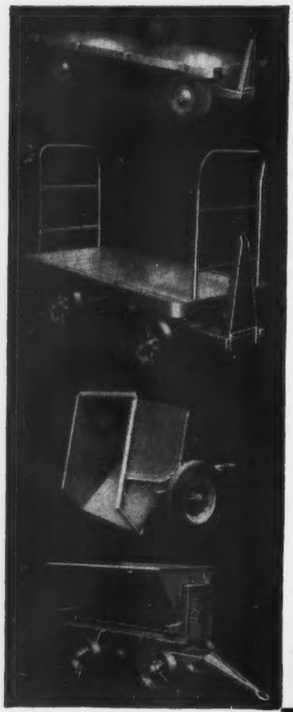
DISTRICT OFFICES

New York, Philadelphia, Pittsburgh, Cleveland, Chicago,



EWC TRAILERS

for Every Industrial Hauling Purpose

Here . . . in the comprehensive EWC Line . . . are carriers of materials and merchandise for every type of industry. And besides the many standard models, our engineers have worked out hundreds of variations to cut handling costs on individual and special haulage problems:

- **For every hauling range . . . floor, yard, inter-plant, street, or any combination.**
- **Any capacity desired.**
- **Platform or dump bodies, or any type of special racks.**

EWC Trailers are built for SERVICE . . . and that means less servicing.

WRITE FOR BULLETINS, prices, and suggestions for solving your special problems.

ELECTRIC WHEEL COMPANY

Dept. F.A.

Quincy Illinois

NEW PRACTICAL DATA On

1 Reducing Materials Handling Costs.

2 Saving Floor Space.

3 Reducing Investment and Upkeep on Materials Handling Equipment.

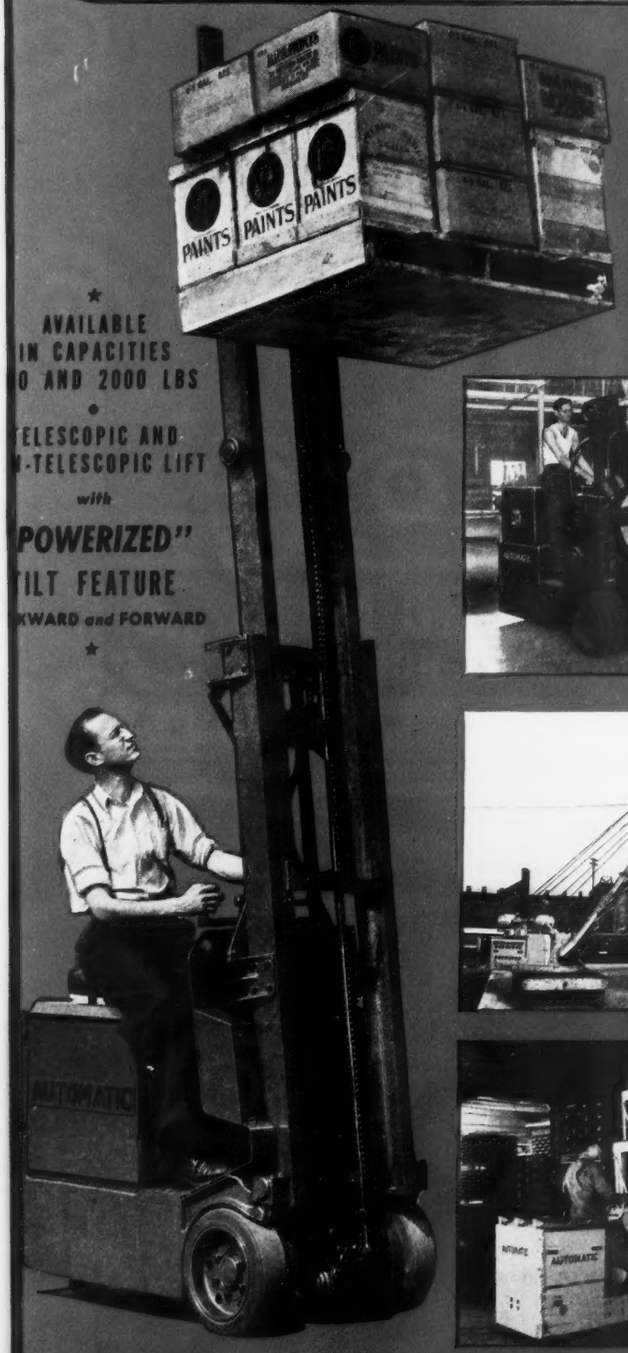
• This comprehensive illustrated catalog . . . showing the latest developments in Lyon Steel Shelf and Shop Boxes . . . contains many industry-proved ideas for practical time, labor and space savings. It shows strong, convenient tote boxes for storage of small parts, safe transportation of work in process, stacking boxes, nesting boxes, and special steel containers that will step up the efficiency of even the most modern production systems. Send for a copy of this catalog of modern materials handling ideas and equipment.

LYON METAL PRODUCTS, INCORPORATED

1211 River Street, Aurora, Illinois

LYON STORAGE EQUIPMENT *Service*

TRADE "AUTOMATIC" MARK MODERN PRODUCTION TOOLS CONTRIBUTING ECONOMIES *to all Industry . . .*



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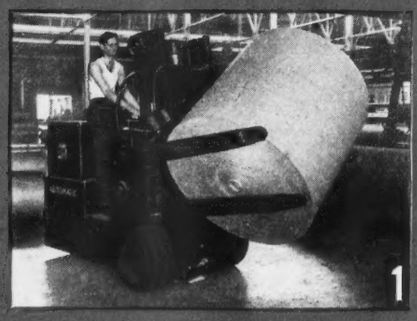
IN CAPACITIES
0 AND 2000 LBS
•
ELESCOPIC AND
-TELESCOPIC LIFT
with
POWERIZED"
ILT FEATURE
XWARD *and* FORWARD
★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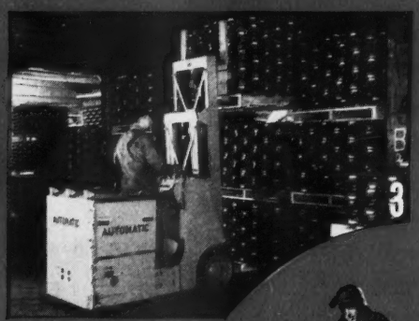

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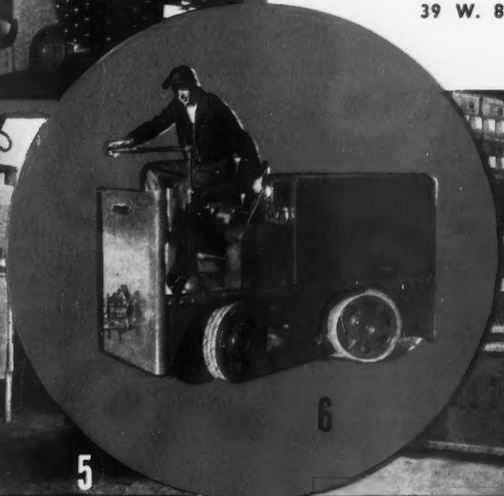
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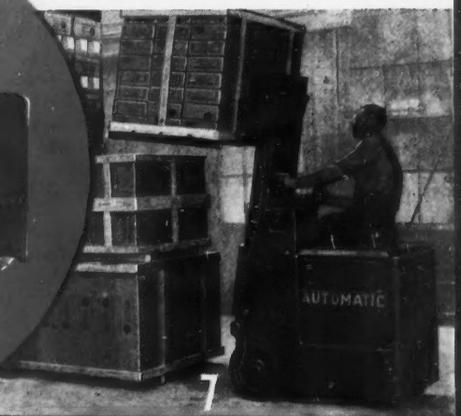

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Here are illustrated some of "AUTOMATIC'S" TIME-PROVEN PRODUCTION TOOLS, which today are vital factors twenty-four hours, day in day out, contributing successful, dependable, economical, profitable handling, transportation and stacking in many industries in United States, Canada and Foreign Countries.

The Roster* of "AUTOMATIC'S" fleet and unit installations reads like the Blue Book of American Industry.

That's only natural! "AUTOMATIC" earned this leadership. For, over three years ago "AUTOMATIC" anticipated modern production requirements, which became apparent for new flexible transportation facilities with speed, precision, safety and efficiency regardless of load.

The Result! "AUTOMATIC" was prepared years ahead with a complete line of electric propelled material handling equipment developed in every capacity to serve this growing demand. So when you buy Industrial Trucks, don't buy automatically! Buy "AUTOMATIC."

Perhaps one of these "AUTOMATICS" shown is just the type you need right now! Write or 'phone today for full details and prices without obligation.

**Names on request.*

1 Center Control Truck with Motorized Revolving Paper Roll Device.

2 Motorized Slewing Crane Trucks—Capacities 3,000 to 10,000 lbs.

3-4 Center Control Fork Trucks — 3,000 to 6,000 lbs. Capacities, Telescopic and Non-Telescopic.

5 Low-Lift Elevating Platform Trucks—Capacities 2,000 to 60,000 lbs.

6 Tractors—Two and Four Wheel Drive—Capacities 1,000 to 6,000 lbs.

7 Center-Control Fork Trucks—Capacities 1,000 and 2,000 lbs.

AUTOMATIC TRANSPORTATION CO.

DIV. OF THE Y. & T. MFG. CO.
39 W. 87th St., Chicago, Ill.

WHEN YOU BUY TRUCKS · · *Buy* "AUTOMATIC"

The new LIFTABOUT ELECTRIC HOIST

CAPACITIES ONE-EIGHTH TO TWENTY TONS

OUTSTANDING FEATURES

"Balanced Drive" Heat-Treated Gearing
Automatic Oil Bath Lubrication
Antifriction Bearings Throughout
Sealed Enclosures for All Vital Parts

have made the new *LiftAbout the most widely used electric hoist in American Industries.*

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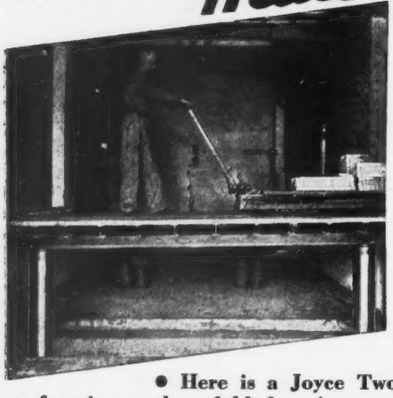
NEW ANTIFRICTION BEARING LIFTABOUT OPERATING WITH A SHEPARD NILES SINGLE I-BEAM CRANE

SHEPARD NILES CRANE & HOIST CORP.

364 Schuyler Avenue, MONTOUR FALLS, N. Y.

JOYCE HYDRAULIC Materialift for



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Eliminates Ramps Speeds Up Truck Loadings

Cap. to 30 tons

● **Here is a Joyce Two-Piston Materialift performing a three-fold function as (1) Loading Platform, (2) Ramp Eliminator, (3) Bridge between two buildings. Material may be moved from building to building or lowered to truck or ground level. These heavy-duty Materialifts have all the superior design features of the single piston unit. A mechanical equalizer may be used with platform attached to each piston head by swivel bearings. Our engineers will gladly analyze *your* problem. *Just send the coupon.***

THE JOYCE-CRIDLAND CO. • DAYTON, OHIO

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For Small Parts

USE ELEVEYORS

ELIMINATE HANDLING IN PRODUCTION

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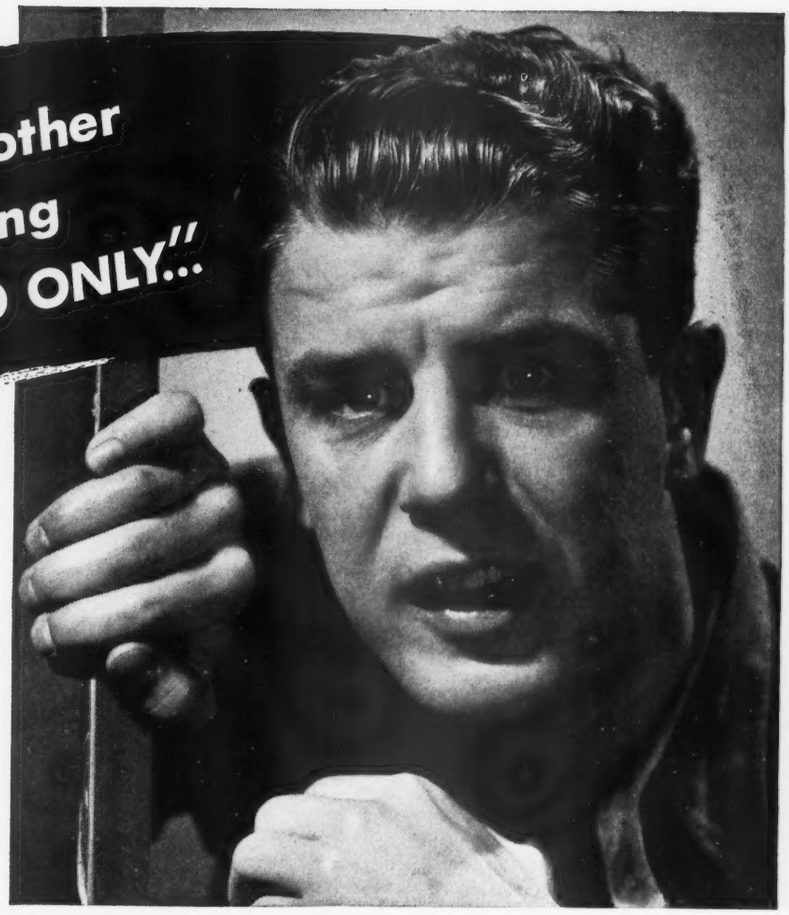
MECHANICAL HANDLING SYSTEMS, INC.

4610 Nancy Ave. Detroit, Michigan



"IF'S" won't help ...but MACWHYTE SLINGS will!

Replace Worn, Old-Fashioned Lifting Elements NOW With The Safety Sling: Macwhyte ATLAS Braided Wire Rope Slings

"An ounce of prevention is worth a pound of cure."

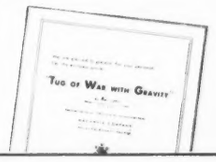
Nowhere is this more true than when you're lifting materials!

The Problem You may have in your plant, right now, some worn, dangerous lifting elements. Which do you think will cost more: to replace them with modern, safe, extra-duty slings like Macwhyte . . . or take a chance on their breaking and possibly causing costly injury or property damage?

The Solution Leading manufacturers all over America are solving this problem by installing Macwhyte ATLAS Braided Wire Rope Slings. They know it doesn't pay to take chances, and they choose *Macwhyte* because they want the best, the safest . . . a sling with a patented braided body of right lay and left lay endless ropes.

These SAFETY SLINGS are unusually strong, light, pliable, and easy to handle . . . they "hug" the load.

Furnished Without Obligation Expert Consulting Service. Write us about your handling problems. Our engineers will study them, help you solve them, show you how to get better service at lower cost. This consulting service is furnished without obligation.



"Tug of War with Gravity". . . The most complete, yet condensed editorial on the entire subject of slings and safe practice in lifting. Embraces types of connections, important rules, on all kinds of slings. Reprinted from National Safety News—edited by the National Safety Council. Of interest to plant managers, purchasing agents, superintendents, foremen, and riggers. Ask for your copy on your company letterhead, there is no charge.

NO. 425

MACWHYTE COMPANY, Kenosha, Wis. Manufacturers of Wire Rope and Braided Wire Rope Slings. Distributors throughout the U. S. A. New York . . . Pittsburgh . . . Chicago . . . Ft. Worth . . . Portland . . . Seattle . . . San Francisco

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Braided WIRE ROPE *Slings*

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SERIES "99" SWIVEL
"98" STATIONARY

The steadily increasing use of these new casters is the result of unusual quality and satisfactory service in operation.

FOR FURTHER INFORMATION
SEE OUR CATALOG IN SWEET'S

● **For use wherever real ease of operation, quietness and dependability are desired. These double ball race, precision made, projection welded casters carry their loads economically. Furnished with 3", 4", 5", 6" and 8" wheels, swivel and stationary to match.** • **This is only one type in the Bassick line of over 500 truck casters . . . a *complete* line that includes the correct size and type for every requirement. Sold by leading industrial distributors conveniently located to give you service. Write for catalog No. 120.**

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FACTORY MANAGEMENT *and* MAINTENANCE

330 West 42nd Street
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Elwell-Parker Systems—Correctly-Designed Trucks, Suitable Attachments, and a Sound Operating Plan—Will Liberate Your Aisles, Create Permanent Cost-Reductions

High-production machines are running at top capacity. Volume loads of materials are brought up, processed, speeded along. Aisles are busy but *open to traffic*—thanks to this well-planned, Elwell-Parker *System* of Material Handling.

You too can enlarge and clear *your own* aisleways—even in older buildings! Load materials on pallets or skids and *keep* them there throughout processing. Transport them in mass volume, speedily, safely, cheaply, by Elwell-Parker Trucks, Tractors or Cranes of suitable design for your especial needs.

When not immediately needed, clear your aisles by rushing loads away on Elwell-Parkers. Store where most convenient—save floor-space by high-tiering to roof. Speed them back to the next process whenever you wish—hours or weeks afterward.

Whatever your industry, long-experienced Elwell-Parker Engineers will gladly help you find ways to eliminate waste, save money. Telephone, wire or write—*today*.

The Elwell-Parker Electric Company, 4323 St. Clair Avenue, Cleveland, Ohio.

ELWELL-PARKER *Power Industrial* TRUCKS

ESTABLISHED 1893 • BUILDING POWER INDUSTRIAL TRUCKS SINCE 1906

The BROWNING CRANE & SHOVEL *Co.*

ESTABLISHED 1899

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YOU *KNOW* YOU'RE RIGHT WITH WRIGHT *Improved High Speed* HOISTS

● Users of Wright Improved High Speed Hoists know they're right—that their hoisting jobs are being handled right, and their hoisting costs showing up right.

Twenty-one points of superiority fit the Wright Hoist to your purposes. There is zinc coating which prevents corrosion. There is a safety guard for the load chain that makes it impossible for the chain to ride out of the pocket, regardless of position. There are precision load wheel bearings that assure fast, smooth, positive action. Eighteen other important advantages go to make the Wright a safe and economical hoist.

The Wright Catalog gives much useful information on hoists, cranes and trolleys. Write for your copy.

BUY ACCO QUALITY *in Wright Hoists, Cranes and Trolleys; TRU-LAY Preformed Wire Rope, Reading-Pratt & Cady Valves; Campbell Abrasive Cutting Machines, American Chains, Page Welding Electrodes and Page Wire Fence.*

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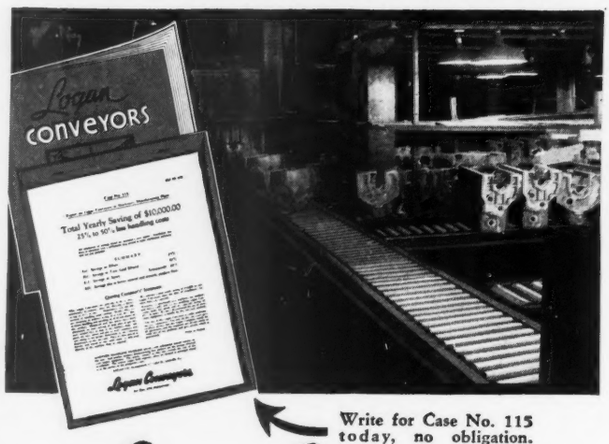

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3 **Collapsi-Bin**—Bulletin C-1 describes a multi-purpose work-handling unit which combines a heavy duty bin, rack, and pallet in a single unit. Will handle loads up to 8,000 lb. Bulletin illustrates flexibility and utility features of this unusual materials handling equipment. **Mechanical Handling Systems, Inc.**

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5 **Conveyor Chain and Sprockets**—28-page bulletin No. 22 describes a complete line of conveyor chain and sprocket with valuable engineering data and illustrations and specifications helpful in laying out and installing conveyor equipment. **Diamond Chain & Mfg. Co.**

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(Continued on page 56)

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THE PROBLEM: What material should be specified for the cover of a conveyor belt carrying hot coke sprayed with oil for a well-known coke plant? Designers knew that the service life of a rubber belting exposed to heat is short enough—with exposure to oil, in addition, the service life would be even shorter.

THE SOLUTION: Laboratory tests on a cover compound made of neoprene, Du Pont's chloroprene rubber, showed it superior to all materials tested in its resistance to oil and heat. So a neoprene conveyor belt was constructed and installed in the coke conveyor, where it is still giving perfect service after more than a year of continuous use.

THE MATERIAL: Neoprene resembles natural rubber in strength, elasticity and toughness . . . yet it is far more resistant to oils, gasoline, heat, sunlight, aging, even corrosive acids and gases. For this reason, many products used in industrial plants are made of neoprene. Plant truck tires, gloves, shoe soles and heels, portable drop cord, oil and air hose . . . hundreds of long-lived, money-saving products.

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16 **Motor Trucks**—Three new profusely illustrated catalogs describe the entire line of 42 basic models ranging in capacity from the light delivery unit to the largest six-wheel trucks with the carrying capacity of 42,000 lb. Also describes multi-stop delivery units and new heavy duty cab over engine models. **International Harvester Co.**

17 **Rubber-Tired Wheels** — Attractive catalog describes complete line of rubber-tired wheels designed to give full floor protection, reduce noise and shock and offer the economy of longer wheel life and less material breakage. Includes design specifications and illustrations of many types of industrial applications. **French & Hecht, Inc.**

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20 **Solving Handling Problems**—48-page book presents pictorially many solutions to industrial handling problems. Details and illustrations of equipment construction are included in a book that shows practical applications of materials handling in many diversified industries. **American Monorail Co.**

21 **Special Industrial Trailers**—Bulletins A638 to A648 describe a wide variety of special purpose trailers, trucks, and carts. Bulletins are well illustrated and tell purposes for which each unit is best adapted. **Electric Wheel Co.**

22 **Steel Strapping**—Booklet describes strapping tool with automatic feed. Illustrates how "Ace" tool does the whole job with 2 easy natural motions of the arm and guides strapping. Tells how seal is applied and strapping is crimped and cut. Also describes and illustrates accessories. **The Stanley Works.**

(Check numbers on coupon page 55)

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If the platform or other parts are broken accidentally, they can be easily and cheaply replaced.

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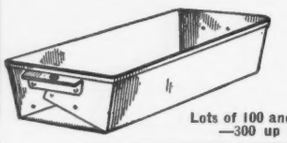
TOTE PANS
(20" x 12" x 6½")
NESTING TYPE—16 ga. Steel



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24 **Tractor Trailer and Lift Truck Equipment**—A complete binder of literature on latest types of electric and gasoline tractors, industrial trailers and elevating platform and fork and ram type trucks. Each bulletin furnishes detailed information on a specific type. Together they provide a ready reference volume on materials handling equipment. **Mercury Manufacturing Company.**

25 **Trucks—Tractors—Cranes** — Data and Bulletins on Modern Intra-Plant Transportation Equipment—now available on a complete line of electric trucks—capacities up to 60,000 lbs. covering low and high lift, fork and ram type; tractors and cranes. Also trucks of special design. Equipment is fully illustrated with dimensions; capacities; and general constructional specifications. **Automatic Transportation Company.**

26 **Truck Casters**—A 48 page catalog covering a full range of types and sizes of industrial casters with wheels from 2" to 10" in diameter and types of wheels for every floor and service condition. Also describes Monel casters for specialized installations where other types are not suitable. Contains detailed specifications and load ratihgs. **The Bassick Co.**

27 **Truck Casters**—Catalog K-26 is a comprehensive book containing valuable information and engineering data that simplifies the selection of the proper casters to meet industrial requirements. Includes complete price list. Also a leaflet containing data on a new series of steel casters Nos. 40-A and 41-A. **Bond Foundry & Machine Co.**

28 **Wire Rope Slings**—Two booklets containing over 70 "on-the-job" photos . . . "How to Handle Loads Safely" and "Safe Handling" . . . illustrate safe practice in handling many types, sizes, and shapes of loads with braided wire rope slings. These booklets show how leading manufacturers are solving materials handling problems speedily, safely, economically. **Macwhyte Company.**

29 **Work Carriers**—Bulletin R3 describes work carriers adapted to handling many parts in a single load by the use of either a lift or fork truck. Application photographs show standard and specially designed carriers for handling a variety of regular shaped and odd shaped production parts. **Mechanical Handling Systems, Inc.**

(Check numbers on coupon page 55)

Investigate

the money saving advantages of these two new MERCURY TUG TRACTORS

GAS POWERED MERCURY TUG

MODEL A-352

The power plant is a complete unit assembly which may be easily removed for service and re-installed by two men in less than an hour's time.

In addition to the exclusive unit assembly, the gas powered Tug offers many other important features.

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- All welded, heavy plate, unit type frame.
- Semi-elliptic spring suspension front and rear.
- Speeds to 8 M. P H — maximum D. B. P. 2500 lbs.

Bulletin 185 contains full specifications.

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MEDIUM DUTY
HEAVY DUTY

In electric tractors the Mercury "Tug" can't be equalled for power — ruggedness or compactness.

- Drive Axle—double reduction, spiral bevel and spur gear type.
- Motor — high overload capacity — rubber cushioned.
- Controller — snap action, mechanical contactor type.
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- Frame — all welded, steel plate construction.
- Springs — semi-elliptic — front and rear.

Completely described in Bulletin 175.

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- QUICKLY ADAPTED FOR ANY SIZE PART

Send for Catalog R-2

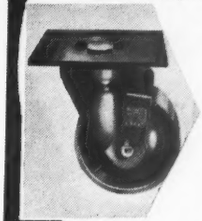
MECHANICAL HANDLING SYSTEMS, INC.
4610 Nancy Ave. Detroit, Michigan

There's a Darnell Caster or wheel for every industrial need. Made with rubber or semi-steel treads.

Nearly 4,000 TYPES OF DARNELL CASTERS and WHEELS

. . . save floors, lengthen life of equipment and increase the efficiency of your employees.

Borrow the wisdom of caster experience. Let the skill of Darnell engineers furnish the sources of profit in caster use. In every Darnell Caster and Wheel there is a responsibility that is reflected in maximum service.



For Savings, Service Safety and Speed— Demand Darnell Dependability. A caster or wheel for every industrial use.

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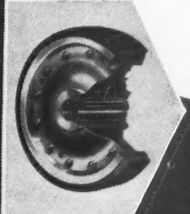

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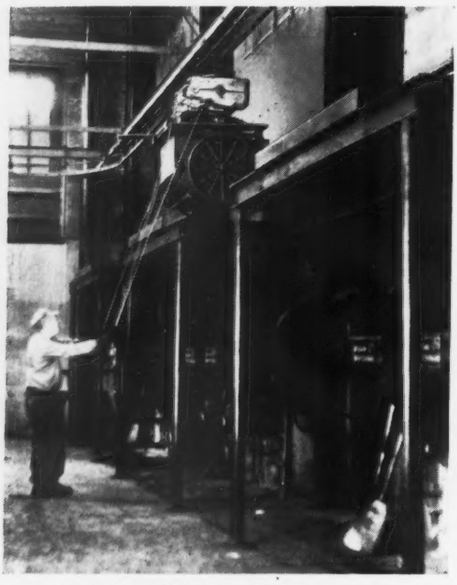

This R & M Electric Hoist takes coal from storage by means of a rolling bottom-dump bucket—and keeps the stokers stoking. It is designed to use little current and operate dependably, economically, year after year. It's another example of the way R & M Hoists and Cranes are engineered and precision-built to *fit the job.*

R & M Electric Wire Rope Hoist; 1-ton capacity; push-button control; speed, 40 ft. per min. (also available in faster or slower speeds).

● *Let R & M engineers tackle your problem. Briefly outline it in a letter—you'll get action!*

ROBBINS & MYERS, INC.

HOIST & CRANE DIVISION • SPRINGFIELD, OHIO

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PUT BOND 36-A Casters under your trucks and watch how easily they glide over your plant's roughest floor. Smooth, fast handling—smooth, fast swiveling are engineered into rugged 36-A's. Bond caster metal, plus a special arrangement of the ball races, gives the 36-A a long, productive life span. Bond builds a cost-cutting caster for every handling job. The Bond Truck Caster Catalog shows which caster will best suit *your* needs. Write for it today.

For smooth, fast handling in a lightweight caster, specify Bond 40-A Fabricated Steel series.

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ON EVERY CARLOAD HANDLED

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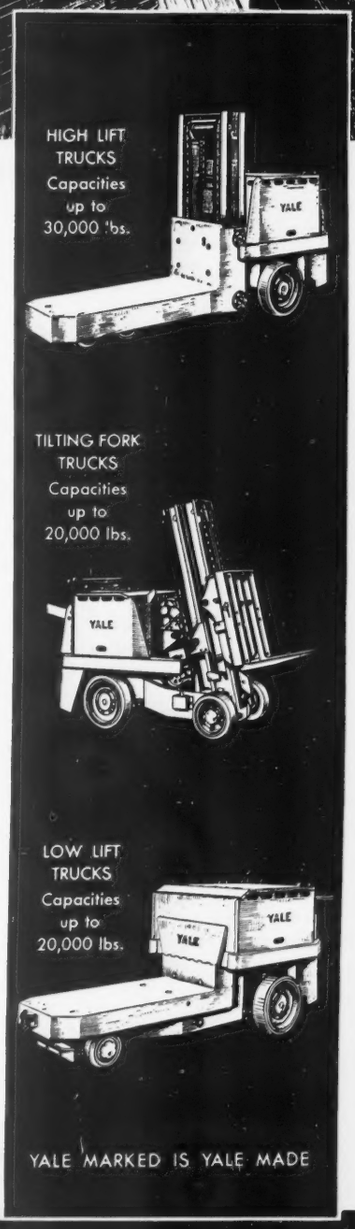
Before installing their YALE Electric Tilting Fork Truck, it took 8 men 4 hours to unload one carload of zinc. Today, the same job is done by one man in two and one-half hours! In addition, the possibility of accidental injury to workmen has been practically eliminated and the busy railroad switch is kept constantly clear for other traffic.

Say Ball Brothers:

"The first of our nine YALE Electric Trucks, purchased more than 12 years ago, still are in daily use and giving highly satisfactory service. YALE standardization of parts permits keeping our older trucks thoroughly modern and up-to-date. We consider the maintenance requirement very low. We feel that the demonstrated dependability and long life of our YALE trucks *justifies the confidence we have placed in your equipment.*"

YALE *always* justifies the industrial confidence placed in their equipment—because YALE Electric Trucks always deliver the goods! Just as modern YALE methods helped Ball Brothers solve a particular handling problem—they can help YOU.

A staff of competent engineers stand ready with the cost-cutting answer to your handling worries. Call them in—through your nearest YALE representative, or send direct for free catalogue.



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2½" DIA. 16 GA. ROLLER
SOLID HARDENED RACES
12—½" CHROME STEEL BALLS
HARDENED INNER RACE
HOG RING OR COTTER KEY
7/16" HEXAGON SHAFT
ANGLE OR CHANNEL FRAME
CAPACITY PER ROLLER ON LEVEL LINES 175 LBS. ON SLOPED LINES 125 LBS.

STANDARD Conveyor engineers, with more than thirty years of experience and special knowledge to draw upon, place a great deal of emphasis on the proper type of bearing for roller conveyor service.

All bearings used in Standard Roller Conveyors are built by Standard to the highest possible standards—sturdy, compact, and of a design which retains its sensitiveness and life during years of operation under the most adverse conditions.

Bearings are just one of the many details typical of the sound engineering and construction of Standard Conveyors.

Call a Standard Engineer on your next conveyor requirement and send for bulletin "Conveyors by Standard" FM-11—a valuable reference book on conveying methods.

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in the cost-reducing program

INDUSTRY'S TOTAL BILL for power and fuel is about $1,500,000,000 per year. Reputable engineers estimate that approximately 35 per cent of this expenditure is wasted. Therefore, it is possible for industry to save in the order of $525,000,000 annually through the selection, installation, operation, and upkeep of modern power generating, transmission, and consuming equipment.

Wasted heat costs money in any plant. In some plants, maintenance of proper temperature affects quality of product. In all plants heating has a direct influence upon employee efficiency, health, and morale. The total cost of wasted heat, lowered production, inferior quality, and impaired employee relations offers an unmistakable field for cost reduction.

The nation's light bill in 1939 will be at least $1,500,000,000 less than it would have been if the incandescent lamps of 1900 were still in use. Improvements in lamps and other lighting equipment so pronounced from 1900 to date, are still going on at a rapid pace. This means that industry, with its present relatively low light bill, can secure for its lighting dollar increasing returns in the form of higher intensities, increased production, fewer accidents, better employee health.

Air conditioning must be approached from the angle of its advantages to product, people, and profits. Lower production costs are demonstrated in better quality control, continuity of manufacture, stabilized employment, better satisfied workers with better health and increased customer good will.

WHAT TO DO

SUGGESTIONS THAT POINT THE WAY

Determine economy of buying *vs.* making power (by steam or diesel).

When power is made by steam: Check efficiency of boiler room equipment and methods of operation; determine most economical kind and grade of fuel; economizers, superheaters, etc., when necessary.

When power is purchased: Study contract in respect to terms and needs; control demand peaks; correct power factor; stop power leaks.

Compare suitability of heating system and devices with best available.

Check effectiveness of temperature controls.

Avoid waste of live steam for heat.

Improve buildings to stop heat loss.

Check condition and cleanliness of lighting equipment; see that fixtures are properly located, and compare their efficiencies with latest designs; be sure that lamps burn at rated voltage; check need for greater intensities.

Investigate the possibility of increasing or stabilizing production, reducing spoilage, improving quality, by the use of air conditioning.

Consider the possibility of beneficial effects upon employee health and stabilization of employment.

DO YOU KNOW

The Facts of Light?

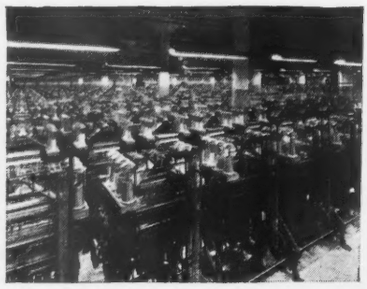
"Better than daylight" conditions prevail in this windowless plant of the Simonds Saw and Steel Company, Fitchburg, Mass. All daylight is excluded, yet the plant atmosphere is always cheerful and bright. "Engineered" installation of Cooper Hewitt Fluorescent lamps.

"Engineered" lighting takes on added significance when we consider that 87 per cent of the worker's perceptions guiding his performance are received by the eye. Thus, our modern axiom for industrial employees, "He works best who sees best."

To obtain the right kind of lighting, a company must have an installation planned to meet *all* the needs of *each* individual plant or department. Our industrial specialists will be glad to assist you in planning an "engineered" lighting system. They have available a complete line of industrial light sources, to provide greatest possible employee eye-comfort and productive efficiency. General Electric Company, Dept. 166-FM-K, Nela Park, Cleveland, O.

●

Over 40 footcandles of cool blue-white light makes seeing easy at Dexdale Hosiery Mills, Lansdale, Pa. Threads stand out as if magnified under the detail-revealing light. "Engineered" installation of Cooper Hewitt Fluorescent lamps.



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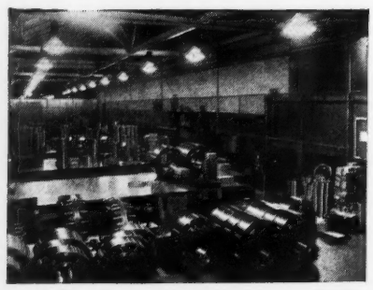
Color-corrected light is obtained at SKF Industries, Philadelphia, by combining Mercury and Incandescent bulbs in the same luminaire. "Engineered" installation of MAZDA Type H Mercury lamps.



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Directional control of shadows is supplied by long-tube light sources at Siler City Hosiery Mills, Siler City, N. C., to make every end show up clearly. "Engineered" installation of Cooper Hewitt Mercury lamps.

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Minimum glare and shadows are possible at Standard Register Company, Dayton, Ohio, by use of long-tube light sources. "Engineered" installation of Cooper Hewitt Mercury lamps.

GENERAL ELECTRIC

963F

Cuts Insurance Cost $1,531

Dust control equipment in this foundry meant a 35% cut in insurance premiums

A company in Indiana manufacturing crushing, grinding, and pulverizing machinery employs approximately 100 men in the foundry, and has an average yearly payroll of $153,000 in that department. Before improvements were made in the control of dusty operations, the occupational disease insurance premium was $2.86 per $100 of foundry payroll. Upon completion of the dust control project the company obtained a reduction of 35 per cent in the premium, reducing the rate to $1.877 wth a resultant saving of $1,531 a year.

This saving was obtained by effectively confining the dust generated from the casting cleaning, shakeout, molding, and sand conditioning processes, and by good housekeeping. The key to reduction of dust from casting cleaning, and other operations was the installation of an effective exhaust system, with hoods provided at all dust-producing points. A total volume of 13,000 cubic feet of air per minute is exhausted from these points. The dust is collected by impingement on wetted surfaces of the equipment and disposed of as sludge.

The unusual type of hood that was developed for control of the dust generated at the shakeout process effectively protects the workmen at this point, but does not interfere with the speed of operation.

197% Return on Cost of Steam Engine

A Middle-Western dairy drives the compressor of the refrigerating plant at a cost of 0.466¢ per kilowatt-hour, by using a steam engine. Cost of power with motor drive was 3.11¢ per kilowatt-hour. About 98 per cent of the engine's exhaust is used for process.

Approximately 3,600 hours of operation a year represent a consumption of nearly 134,000 kilowatt-hours. The difference of 2.644¢ per kilowatt-hour in the cost of driving this compressor by motor and by steam engine results in a saving in excess of $3,500 per year. With this saving the return on the installed cost of the engine ($1,791) is 197 per cent. Therefore the investment in the engine was returned in seven months of operation.

Lowers Maintenance Cost with Combustion Control

Design of the furnaces of two 500-hp., chain-grate, stoker-fired boilers operated by one industrial plant made it difficult to maintain good regulation of draft and fuel feed. This situation in turn led to much trouble in keeping the desired steam pressure, and there was an annoying smoke nuisance. Furnace refractories frequently required extensive repairs, resulting in high maintenance cost.

Some time ago both boilers were equipped with automatic combustion control. The most important result has been a 50 per cent reduction in furnace maintenance. Savings from this source alone were sufficient to pay for the control in a year and a half.

Other worth-while advantages are that the steam pressure is now being held constant, and no more trouble is experienced with smoke.

Pulverized-Fuel Boiler Saves $35,000

Five old water-tube boilers that formerly supplied the plant of Sonoco Products Company, Hartsville, S. C., with steam, were replaced with one pulverized-coal-fired boiler with integral furnace. This new unit is equipped with superheater and air heater. It has a capacity of 60,000 pounds of steam per hour and is operated at a pressure of 225 pounds per square inch, with total steam temperature of 600 degrees Fahrenheit.

The saving in fuel alone amounts to more than 31 tons per day, when operating 24 hours per day. Incidental savings bring the total to more than $35,000 a year.

Cooling Coils Control Motor Temperatures

One of the steel mills located near Chicago was confronted with the problem of cooling its large electric motors. Many plants of this type use ventilating fans to give frequent changes of air in the motor room, and thus carry away heat generated by motors.

In this plant it was decided that the air brought in for cooling would not be clean, and that the dust particles in it would be injurious to the motors. Therefore the engineering department, in cooperation with a radiator manufacturer, worked out a cooling system designed to use lake water as the cooling medium. It consists of a series of extended-surface cooling coils with copper tubes and fins. The air in the motor room is continuously recirculated and cooled to such a point that the room can be maintained at a satisfactory temperature.

After passing through the cooling

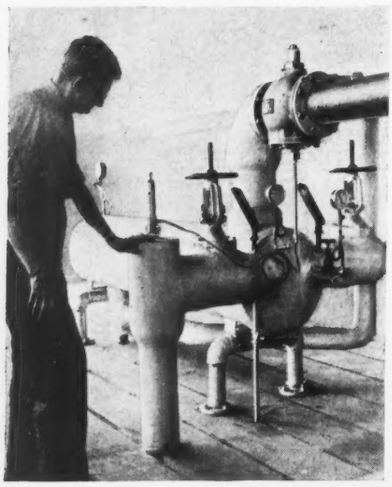
coils, the water is pumped back into the lake at a point some distance away from where it was taken out. Very little fresh air is admitted to the motor room—just enough for ventilation. As a result, little dust and dirt get in.

Installation and operating costs of this system are considered to be a good investment, because plant costs have been reduced through lower maintenance expense and fewer shutdowns.

Now No Steam Is Wasted

Installation of a temperature regulator and a few simple changes, enabled a well-known brewery to make a worth-while saving in steam and eliminate all trouble formerly experienced with one of the operations.

A 500-barrel water tank for barrel washing is supplied with water which comes from the beer coolers at a temperature of 110 degrees F. For washing barrels the temperature of the water must be 120 degrees F. Formerly,



Automatic temperature regulator puts an end to live steam waste in brewery

this boost in temperature was secured by introducing live steam into the tank. With manual operation of the steam valves, however, it was difficult to control the temperature. As a result the water frequently was overheated, with consequent waste of live steam.

Not far away, exhaust steam from the engines was being discharged into the atmosphere. It was not a difficult matter to make provisions for using this exhaust steam to heat the water in the tank. This change, of course, brought about a considerable saving in live steam. The temperature regulator in the exhaust steam line now keeps the water at a constant temperature, without any attention.

Fluorescent Lamps Save $28,700 the First Year

In a large windowless plant the installation of 100-watt fluorescent lamps has effected a saving estimated at $16,900 in the cost of the air-conditioning equipment, with an annual saving of $5,070 in operating costs. These savings result from the comparatively small amount of heat given off by fluorescent lamps, which produce only about one-fourth as much heat as would be dissipated by incandescent lamps providing the same level of illumination. Reduced current consumption has made possible a further saving of $6,760 in lighting cost.

These savings came about through the replacement of 750 industrial lighting units consuming 650 watts each, with about 1,500, 100-watt fluorescent lamps.

Total estimated savings will be in the vicinity of $28,700 during the first year of operation.

Following installation of air conditioning equipment in a large printing plant that does unusually fine work, there was an increase in production of 15 per cent. Since the paper stock always contains the same amount of moisture, there is no more trouble in maintaining proper register. Also, the ink dries faster.

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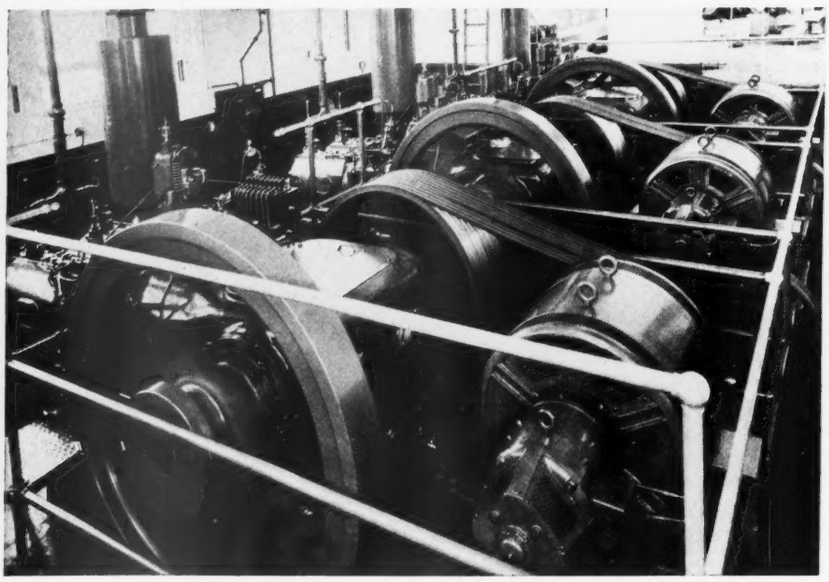
Diesels Pay Out in 3 Years

Kent Cleaners, Incorporated, of Whitestone, N. Y., operate a modern dry cleaning and dyeing plant. In the past, this company had met power requirements with a combination of oil-fired steam boiler and purchased electric power. An adjusted electric current rate (2.1¢ per kilowatt-hour) had effected negligible savings, and, although by no means outmoded, the steam plant was not capable of driving electric generators that would supply an adequate amount of electricity to meet the plant's requirements.

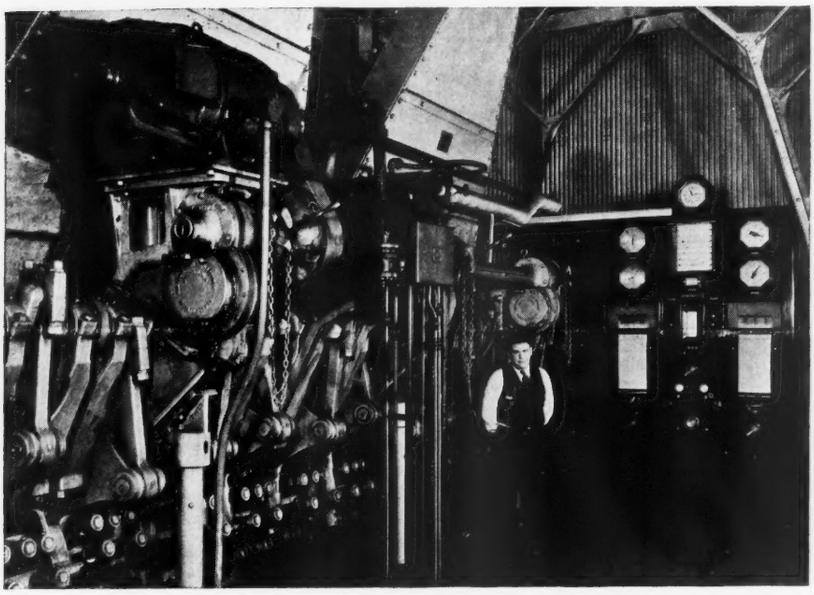
Three twin-cylinder, horizontal diesel engines were therefore installed, each unit being rated 110 horsepower at 327 r.p.m. and driving a 75-kw. generator through a V-belt. Starting air for the diesels is furnished by a compressor unit, and the three diesels and their generators are mounted on one concrete foundation which is isolated from the rest of the building.

The engines are fitted with remote-control governors. Controls are brought direct to the switchboard panel that the units may be easily synchronized



Three diesels save this plant $1,063 a month, will repay first cost in 3 years

BOILER EFFICIENCY INCREASED 14 PER CENT



By replacing a number of low-pressure boilers with one high-pressure, high-capacity unit equipped with completely automatic combustion control, a large paper mill was enabled to raise the efficiency of its boiler plant from 70 to 84 per cent. The cost of modernization has been more than justified by the savings

from one central location. Modern safety devices guard against low cooling water supply, excessive jacket water temperature, and excess load.

Reliability and cost of equipment were important in the installation of this plant, and the combination of slow-speed horizontal engines and medium-speed generators made possible a cost of less than $145 per kilowatt of installed equipment.

The plant has been in operation less than a year, yet against the purchased electricity rate of 2.1¢, the gross saving is figured to be $1,063 per month. The energy generated each month during the first three months of service averaged 64,000 kilowatt-hours at a cost of $283 for fuel and lubricating oil. With slow-speed, heavy-duty diesels, equipment maintenance is generously set at $1 per horsepower per year. No additional personnel is necessary for the operation of the diesel electric units. The user anticipates amortization within 36 months.

$1,500 Less for Coal

A large paper company put the generation and distribution of steam under the control or supervision of appropriate instruments. Result was a saving of $1,500 a year in coal cost.

Records show that the amount of fuel burned per gallon of water pumped has decreased 16 per cent.

Adds 10 Months to Boiler Brickwork Life

A large Eastern textile mill operates two boilers, each having two mechanical atomizing oil burners, using bunker C oil. Furnace volume is too small for the load carried on these boilers. Since the sidewalls are only 6 feet apart, the flame impinges directly on the sidewall brickwork, with the result that extensive repairs were required every 6 weeks.

The boilers were originally set with first-quality firebrick which were not given any coating to protect them from the impingement of the flame. After a few months the sidewalls required extensive repairs, and a premium-priced firebrick was installed. It stood up better, but conditions were far from satisfactory and the maximum service obtainable from this type of brick was about fourteen months.

A plastic, super-refractory material was tried on the walls of the furnace of one boiler. At the end of 6 weeks it was found intact, although materials previously used had failed within a short time. There was no glaze on the walls. By using this material at intervals of every 6 weeks, when the boilers come off the line, this company found that from 21 to 24 months service could be obtained from the brickwork, instead of the 14 months' life formerly secured.

Economizer Saves $3,000

Some years ago a prominent cement plant installed two fuel economizers in the boiler plant to recover and put to profitable use the heat from combustion gases that were escaping up the stack.

This company has kept an accurate record of costs over a period of years and is now able to give reliable information on the savings effected. After allowing for amortization of the original investment over a 10-year period (most economizers last longer), and with liberal allowances for interest, maintenance, and repairs, these economizers have produced a yearly saving of $3,035 in the fuel bill. When the original cost of the equipment has been amortized, it is estimated that the annual saving will be nearly $6,000.

The design of the fuel economizer used, embodies a series of heavy-gage, cast-iron pipes which are installed between the boiler gas outlet and the stack inlet. The gases on the way to the stack pass around and between the pipes, which contain feed water for the boiler. They enter the economizer at a temperature averaging 517 degrees Fahrenheit, heating the feed water from 212 degrees to 300 degrees. Every heat unit absorbed by the feed water means one less unit to be purchased in the form of fuel.

Centrifugal Refrigeration Saves 25%

Installation of a centrifugal refrigerating machine in a large brewery reduced refrigerating costs 25 per cent. This machine is operated by the steam used for process work. Practically all the energy of pressure reduc-

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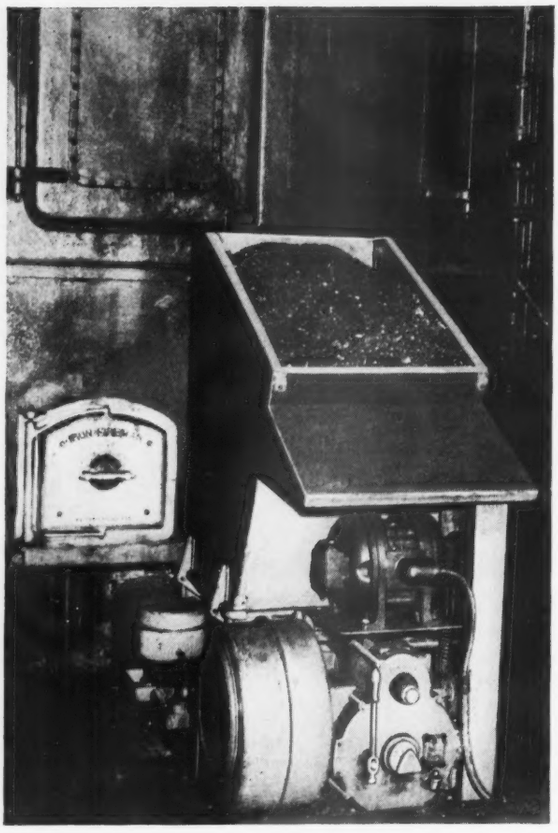
Information provided by boiler control instruments enabled a steel products plant to make changes which eliminated the necessity of installing an additional boiler. This saving in the cost of a new boiler is between $15,000 and $20,000.

WITH A STOKER, SLASHED FUEL COSTS 66%

Pennies per hog saved in fuel cost are producing cash savings of several hundred dollars a month for P. D. Gwaltney Jr. & Company, Incorporated, Smithfield, Va. The Gwaltney plant packs a well-known brand of hams from peanut-fed hogs. Before modernizing its boiler room, Gwaltney's fuel cost was 9.7c per hog. Also, there was a smoke nuisance problem, and steam pressure varied erratically. Modernizing its plant with worm - and - ram stokers, Gwaltney slashed fuel costs 66 per cent—down to 3.3c a hog. Steam pressure is kept steady, which helps to improve the productive efficiency of all departments. And all smoke nuisance has been eliminated. With mechanical firing equipment, economical nut and slack coal are burned as efficiently as the more expensive fuel previously used



tion for process use, which is normally wasted, is utilized; therefore refrigeration becomes in effect a byproduct, and the steam leaving the machine is still available for process operation.

At the same time a desirable saving was made in space. The centrifugal refrigeration machine occupies about the same space as the compressor it replaced, although it has almost twice the capacity.

**Spent $1,000, Saves $700 per Month

We formerly operated two identical, turbine-driven centrifugal boiler pumps built by a well-known manufacturer. They were originally designed for a maximum pressure of 150 pounds per square inch at 2,500 revolutions per minute. Later on the plant had been compelled to boost the steam pressure to 200 pounds, and the pumps had been speeded up. After fifteen years' exposure to corrosion and erosion the high speed had a tendency to throw the rotating parts of the pumps out of balance. As a result, clearances were not very close, and it was difficult to keep the pumps properly packed.

Internal leakage eventually became so great in the pumps that even at 3,600 r.p.m. they could not deliver sufficient water. The management then called in a factory service man who substantiated the operating engineer's recommendation that it would be advisable to replace the pumps rather than repair them.

Parts alone necessary to repair only one of the pumps would have cost more than the complete installation of two new pumps.

During the summer months we had been discharging considerable steam to atmosphere. One of the new pumps is motor driven, purchased with the idea of improving the heat balance.

We had estimated a $300 saving in fuel. Actually, our monthly cost sheets showed a fuel saving of $700 a month, with no increase in electric power consumption. The smaller steam load made it possible to operate our boilers on natural draft, and the savings in forced-draft power more than offset the power used by the pumps.—*E. F. Sibley*, Chief Power Plant Engineer, Seamless Rubber Company, Incorporated, New Haven.

No Need Now to Stop for Damp Weather

When humidity went above a certain point, a manufacturer of edible gelatine formerly had to close down, in order to avoid the serious risk of spoilage of the product through the hardening and caking that followed absorption of excessive amounts of moisture.

To avoid these costly shutdowns, air-conditioning equipment was installed which maintains the relative humidity constantly at 40 per cent.

Now production of a uniform product goes on every working day in the year, regardless of the weather.

Flow Meters Pay 3,000%

In a cement plant that operates four gas-fired kilns, a flow meter was installed at each kiln to measure the gas consumption. As a result of information supplied by these meters, changes became possible that reduced gas consumption 10 per cent. The resultant saving is $36,000 per year.

Since the cost of the meters was $1,200 the return on the investment is 3,000 per cent.

Stops Steam and Money Loss

Steam losses run into money if the location of the leak is not quickly discovered and remedied.

To prevent such losses, a two-pen temperature recorder was installed in

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In the plant of an electrical equipment manufacturer the pipe coil radiators formerly used in the plant heating system were replaced with fifteen unit heaters. Records of plant heating costs show that the cost of fuel previously averaged about $1,000 per year. The first year that the unit heaters were in service fuel consumption dropped to $700, representing a saving of 30 per cent.

Candy manufacturer found that air conditioning considerably reduced spoilage of product and made continuous production possible, regardless of weather conditions. Another saving comes about through the 25 per cent reduction in the time required for cooling the chocolate coating.

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the heating system at the main plant of Taylor Instrument Companies, Rochester, N. Y. One temperature-sensitive bulb was placed in the steam line leaving the turbine, the other in the return line.

Tests proved that the turbine exhaust, which was used for heating, usually runs at about 240 degrees Fahrenheit. If this temperature goes up suddenly, the engineer knows immediately that something is wrong in the turbine, takes steps to correct it.

Further tests showed that the water returning from the heating system should normally be around 140 to 160 degrees. A rise is shown at once by the recorder. It can usually be attributed to leakage in one of the thermostatic radiator traps or an open bypass somewhere in the system. Either condition causes loss of steam and money.

Flow Meter Showed Which Boiler to Install

Plans that had been made for installing a 150-hp., stoker-fired boiler in a brewery, replacing an old hand-fired unit of the same rating, were completely upset when a flow meter was installed. This meter showed that the peak load was more than 200 per cent of the boiler's rating.

With this information it was a simple matter to avoid the costly mistake of installing a new boiler that would have been too small from the start to meet the needs.

Return on Stoker, 39%

Mechanical firing equipment is paying the S. E. Massengill Company a 39 per cent annual return on its investment, reports Board Chairman S. E. Massengill. This company manufactures pharmaceutical products in Bristol, Tennessee—Virginia.

"The purchase of stokers has been the soundest and most profitable equipment investment we have ever made. We installed our first two stokers in 1929, hence they are now completing their tenth year of service. Since then we have purchased ten other stokers. The entire group has given 50 years' combined stoker service, and the total service cost has been only $29.20 for repairs to one motor.

"This reliability of firing is of inestimable value in delicate process work such as we perform.

"Automatic firing equipment does a heavy-duty job in our boiler plant. With hand-firing, our plant was loaded to capacity. Then we erected a new 5-story laboratory, with new driers, sterilizers, and distilling equipment. And stokers carried the much-increased load with no increase in fuel tonnage.

"We compute our fuel and labor savings as being equivalent to a 39 per cent return on our investment. And the evenness of steam pressure, the elimination of smoke, and the fuel and labor savings each justify the installation cost."

Pressure Up, Costs Down

Paradoxical as it may seem, a soap manufacturer in metropolitan New York faced the winter of 1936 with considerable anxiety—*because his business was increasing.*

More business meant more kettles, and more kettles would require more steam. The capacity limit of the existing hand-fired boiler had long since been reached. In fact, difficulty was already being experienced in delivering an adequate supply of steam to the kettles at the desired pressure of 80 pounds.

The installation of an additional boiler would call for a capital investment greater than seemed justified at that time. Furthermore, land values are high in New York, and space was at a premium.

A study of all these factors narrowed the problem to the question "How can the capacity of the existing boiler be stepped up to meet the increased steam demand?"

The boiler was a 110-hp. return tubular unit set only 5 feet from the floor to the underside of the shell. The floor line was lowered 12 inches to provide a 6-ft. setting height, and a center-retort underfeed stoker was installed.

The factory engineer realized that the best defense against fluctuations in the coal market is the provision of firing equipment capable of burning a wide variety of coals. Hence a moving-grate stoker was selected which could burn successfully high-volatile and low-volatile bituminous coal, or the small sizes of low-priced anthracite—all of which come to market in the New York area.

The ability of the stoker to use coals having widely different burning characteristics proved an important factor in reducing steam costs, and recently, when labor disturbances sharply curtailed bituminous coal production, this feature of the stoker became a vital factor in the continuity of plant operation.

With hand firing, the maximum capacity of the boiler was around 100 per cent of rating. With stoker firing, the boiler can easily be operated continuously at 150 per cent of rating.

This 50 per cent increase in available steaming capacity more than met the requirements of the additional kettles installed. In addition, constant steam pressure was maintained at all times, and this put an end to the losses imposed by the frequent drops in pressure when the boiler was hand-fired. Incidentally, the plant product was improved and the processing time shortened when adequate steam pressure and temperature became available.

The figures for the first two years of operation show that despite a material increase in steam output, the annual coal consumption decreased. An analysis of the steam costs disclosed that the savings incident to stoker operation had paid for the entire cost of the stoker installation in about 20 months. Thus the required additional steam capacity at this plant was obtained with a low capital investment, and the standards of performance were raised both in the boiler room and in the manufacturing process by the adoption of modern stoker firing.

Combustion Control Ups Evaporation 2%

For some time after a high-pressure topping unit had been put in service in one large plant, the boiler was operated under manual control. Under these conditions many economies were effected over the results obtained with the equipment previously operated.

In the desire to cut steam costs still

further, the high-pressure boiler was equipped with automatic combustion control. Records soon showed that with the automatic control, evaporation was 2 per cent greater than it had been when the boiler was manually controlled.

The savings resulting from the ability to produce more steam from the same amount of fuel, or a given quantity of steam with less fuel, paid for the control in less than a year.

Improved Light Increases Output 5 to 15%

A large manufacturer of church, school, and theatre furnishings realized some years ago that heavy production losses were being incurred through poor lighting.

In order to eliminate this condition the company began a program of lighting modernization which has resulted in an average production increase of 5 per cent, with some departments running up to 15 per cent. Lighting equipment now used includes 1,290 units—900 R.L.M. dome reflectors, 105 Glassteel diffusers, 200 deep bowl units, and 85 elliptical reflectors.

In addition, 787 mercury vapor lamps are used for certain operations in the metalworking department, toolrooms, and certain woodworking departments.

The total cost of this installation was $46,756.60. Annual lighting costs, including depreciation, are $14,681.13. Figured on the basis of a 300-day year of average use, the total cost is $48.94 per day. With 1,100 employees, this figure breaks down to a cost of 0.045¢ per man per day.

The cost of the new equipment is approximately double the cost of the installation that was replaced. However, an average increase of 5 per cent in the output of all departments, due to better lighting, has meant a saving of $250 per day, or about $75,000 per year.

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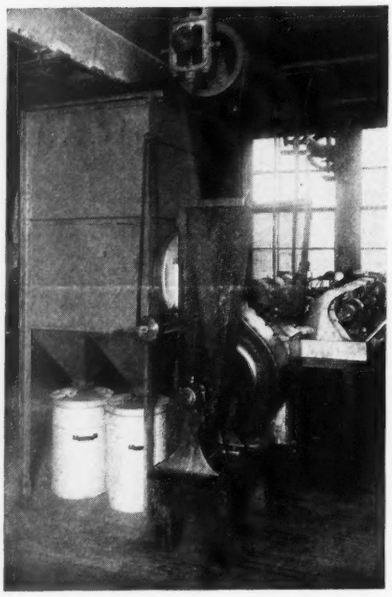
An installation of flow meters to check steam distribution in the plant of a nationally known sugar refinery gets the credit for saving a million pounds of steam per month. This reduction in steam consumption represents a saving that will run pretty close to $6,000 a year.

Dust Arrester Saves $1,487

While the solid gold eyeglass frames, nose pieces, and various other parts made by an Eastern manufacturer are being buffed and polished, minute particles of the precious metal are removed and become mixed with the lint and polishing compound.

To reclaim more effectively the gold particles in the air removed by the exhaust system, a dust arrester of special design was installed, from which more than 70 per cent of the total salvaged precious metal is obtained. The arrester's effectiveness is indicated by the absence of discoloration within the building, and sufficient cleanliness of the air to permit its recirculation to the workroom. In addition to the saving in heat effected by this dust-collecting installation, the average recovery of gold is $1,487 per year.

The exhaust from the buffing wheels on the workbenches is led to the arrester. The dust is dropped into cans beneath the arrester and later sent to the refinery.



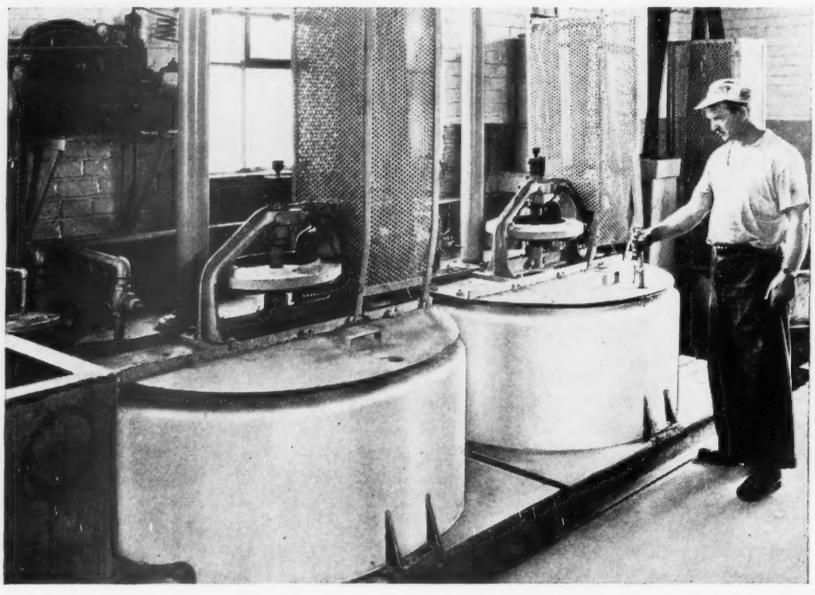
There's literally gold in this dust collection system. It salvages gold dust at the rate of $1,487 annually

Steam Engine Pays 400%

Installation of a steam engine to drive a rotary drier in a large distillery resulted in a power cost of 0.142 cents per kilowatt-hour at the shaft of the drier. All the exhaust steam is used for process.

With motor drive the cost of power is 1.22 cents per kilowatt-hour. This drier is operated more than 7,600 hours

STEAM TRAPS SAVE COST IN 1½ WEEKS



Three thermostatic steam traps were recently installed on kettles in the plant of a well-known New York paint manufacturer. Checking the records of oil consumption for steam generation showed reduced demand for steam brought about by the traps saved enough to pay for them twice over in three weeks

per year, representing a consumption of more than 1,100,000 kilowatt-hours. At a saving of 1.078¢ per kilowatt-hour the saving in the cost of power per year is about $12,000.

This saving is a return of 400 per cent on the installed cost of the engine. In other words, the engine pays for itself in three months of operation.

*Waste Disposal Returns $1,800 Profit

Waste disposal is a problem that is common to most plants. For some time it had been the practice in our plant to dispose of burnable waste in the quickest and easiest manner, without any definite attempt to salvage the heat units which it contained.

After analyzing the load conditions in the boiler plant, we eventually adopted a schedule for burning waste that would not conflict with peak load demands, but at the same time enabled us to recover the heat value of the waste. A spare bin was provided for storing any temporary surplus.

Our savings amount to about $1,800 annually in fuel, without any investment except the building of the storage bin, which was made from odds and ends of lumber around the plant.—*W. T. Estlick*, Plant Engineer, The Ansonia O & C Company, Ansonia, Conn.

Diesel Saves $300 Monthly

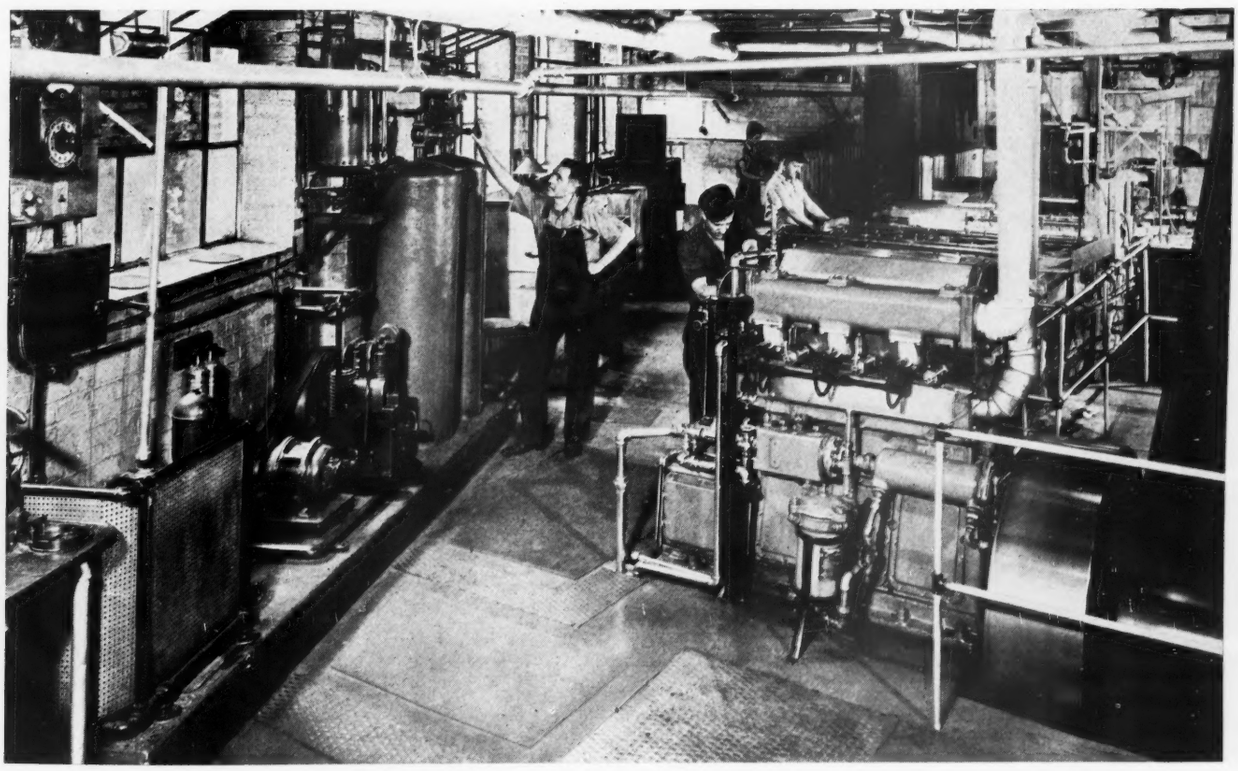
Twenty-one years ago Wm. Langbein & Bros., makers of fine cutlery and surgical instruments, built their own two-story factory in Brooklyn. From the start of operations in that building, they made most of the power needed to drive their equipment. Two gas engines, one rated 50 and the other 33 horsepower, drove line-shafting connected to the grinders and machine tools. Electricity for lights and a 20-hp. motor driving equipment in the foundry was purchased.

Today a 75-hp. diesel engine is installed in the basement and belted to an extension of the old lineshaft. The 33-hp. gas engine has been removed, and a 40-kw. generator has taken its place. This generator is belt-driven by the diesel and supplies all electricity for lighting, two motor-generator sets which furnish direct current for electroplating, a welding set, and a few small motors. Standby emergency service is adequately provided for by the 50-hp. gas engine which is in good condition and can handle nearly all the plant load.

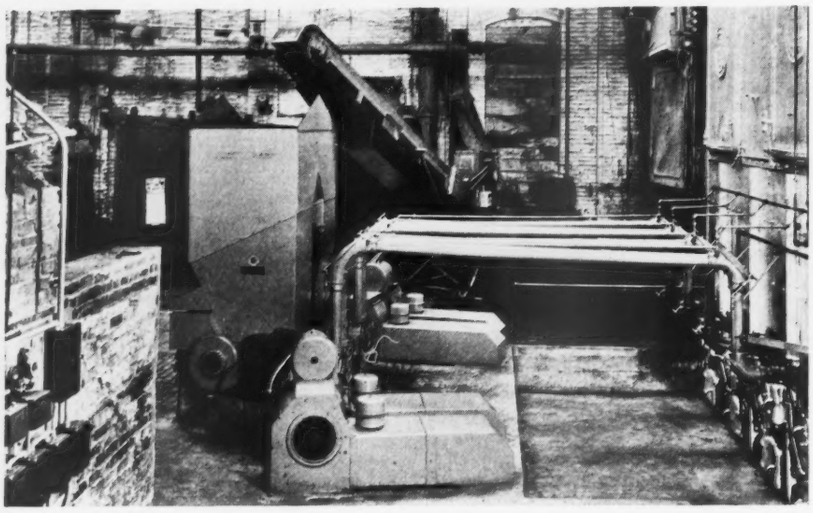
The diesel operates 9½ hours each day, 6 days each week, and is shut down during noon hours to conserve fuel. In starting, the engine is warmed up for a few minutes, after which the main lineshaft load is connected by means of a friction-type clutch. Once up to normal speed, similar clutches at each floor throw their load upon the engine. This clutching is properly timed in order that the entire plant load is never thrown upon the engine at the same moment.

Every six months the lubricating oil is drained from the engine and a fresh supply placed in the crankcase. The drained oil is saved and used for lubricating the lineshaft and machine bearings.

Cooling water flows by gravity from a roof cooling tower, and float-operated alarms function in case of high or low water in the jacket water sump. A separate alarm operates if jacket water temperature becomes too high, and a bell-and-light alarm is provided



Even though equipment has been added since this 75-hp. diesel was installed, power bills average $300 a month less



An unusual fuel saving of $37,500 is attributed to automatic combustion control

as added protection should lubricating oil pressure fall below 8 pounds per square inch.

Since the diesel engine was installed, and even though more equipment has been added to the plant, power costs have averaged $300 less per month than under the old arrangement.

Condensate Return Unit Reduced Steam Cost

During an investigation of production costs a large Eastern paper company found its steam cost to be out of line. A check-up showed that the steam plant was not operating as efficiently as it should. Existing boiler equipment was found to be in good condition, but it was decided that an improvement could be made in the servicing of the boiler.

A very appreciable reduction in steam cost and an increase in boiler efficiency followed the installation of a new condensate return unit with automatic boiler make-up.

Same Load, Saves 780 Tons of Coal a Year

In a plant that manufactures inks it had been considered necessary to operate three boilers in order to carry the plant load. Information provided by a flow meter installed on each boiler showed that if slight changes were made in the methods of firing, it would be possible for two boilers to carry the load.

Accordingly one boiler is now kept in reserve with a resultant saving of 15 tons of coal a week, which amounts to 780 tons a year.

Boiler Instrument Saves $4,500 a Year

For three years after a new boiler and stoker had been installed in a cotton mill they were operated without the aid of instruments. During this period, the average annual cost for fuel was $30,000.

After suitable boiler control instruments had been installed, a saving of 15 per cent in the cost of fuel soon became apparent.

Saving amounts to $4,500 a year.

Cuts Fuel Bill $37,500

Automatic combustion control is saving fuel at the rate of $37,500 a year at the Riverside and Dan River Cotton Mills, Danville, Va. This is an amount equal to four times the original cost of the installation. It was made, by the way, on seven of fourteen boilers whose average age is approximately 20 years, and thus helps explode the commonly held theory that it does not pay to install automatic control on old boilers.

Reclaims Snuff to Tune of $7,200 a Year

In the manufacture of snuff, granulated tobacco is fed to mills in which it is ground to the fineness required for this product. During grinding an appreciable amount of the fine tobacco dust escapes into the air of the workroom, with resultant loss of material and unsatisfactory working conditions.

In one plant that operates four batteries of eight snuff mills to the battery, exhaust hoods were installed, and 4,500 cubic feet of air per minute is exhausted to a dust arrester which removes the fine suspended particles and returns the cleaned air to the workroom.

In addition to greatly improved plant cleanliness and working conditions in the mill room, the exhaust system and arresters save on the average $24 per day in reclaiming snuff which previously had been wasted.

Better Light Pays $60,000

The important part that adequate lighting plays in increasing production, lowering labor turnover, improving product quality, and increasing operating profit is shown by the experience of a large Mid-Western automobile body manufacturer. Each of two departments is showing net savings of more than $30,000 a year, following the installation of proper lighting equipment. This saving has resulted from increased efficiency on assembly lines, elimination of repair work following painting, reduction of labor turnover, and lower production costs.

Two hundred 16-in. R.L.M. dome reflectors, with 200-watt bulbs were installed on 10-ft. centers, 10 feet from the floor. The mounting height was used to attain as complete diffusion as possible. The resulting intensity is about 14 foot-candles.

The system replaced was of the same general type, but included only 120 16-in. units with 150-watt lamps spaced on 12½-ft. centers, which gave an intensity of only 6 foot-candles. The installation cost was the same for both systems—$17.51 per unit.

Results regarded as traceable to the new lighting in all departments can be summarized as follows: For one reason or another labor turnover fell from 6.37 per cent to 2.78 per cent per month. Each 1 per cent reduction means a saving of $96 per year. Labor savings of 8 per cent were made in metalworking departments. Each 1 per cent is a saving of $842 a year. Putty glaze line savings are at the rate of

$30,589 per year. Elimination of striping work repair resulted in savings of $1,680 per year. Finish-polishing repairs were reduced, with a resulting saving at the rate of $30,195 annually.

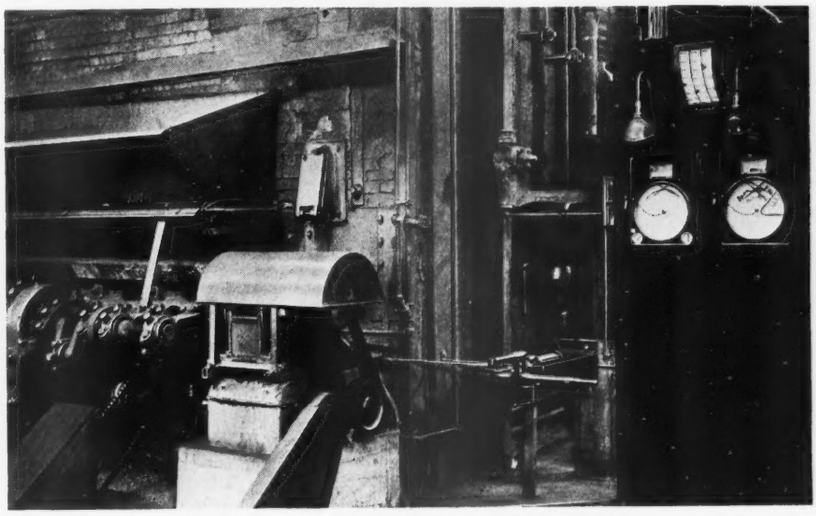
Stoker Saves 37% in Fuel Cost

At the plant of S. F. Bowser & Company, Incorporated, Fort Wayne, Ind., a 750-hp. straight-tube, sectional-header boiler is fired through four coal-conveying systems which are a part of a stoker unit. This unit is made up of two standard, dual-type pneumatic spreaders. The unit is capable of firing 4,800 pounds of coal per hour.

Coal is transported to the boiler by a stream of high-velocity air in four 3½-in. pipes. From the nozzles the coal is distributed over 108 square feet of grate area. The entire combustion volume is 1,700 cubic feet.

The stokers are placed 12 feet from the boiler front in a location that is accessible, cool, and clean. An individual motor drives each transmission, giving extreme flexibility to the coal feed. Two motors drive the low-pressure fans which supply under-grate air. Eight metering devices, one on each overfire and under-grate air feed, maintain a proper fuel-and-air ratio.

Coal cost per thousand pounds of steam was 29.2¢ with hand-firing. Stoker firing has reduced this cost to 18.3¢, a saving of 37 per cent. Firing labor cost has also been cut.



Stoker unit cut coal costs here from 29.2c to 18.3c per 1,000 pounds of steam

Licks Old Bogey, Humidity

Production dollars and hours have been saved at the Novocol Chemical Manufacturing Company, Incorporated, Brooklyn, by making continuous an important process which heretofore could be carried on only during the dry winter months between November and March, because of that old bogey, humidity. The process consists of compressing into tablets the ⅓-grain pills of procaine and monocaine for dental anesthesia which this company produces at the rate of 150,000 per day.

These savings were made by installing one of the new rotary, gas-fired, silica-gel dehumidifiers (summer air-conditioning unit) which is capable of maintaining a relative humidity of 25 per cent in the 2,300 cubic feet of space occupied by the tablet department. As a result, the moisture-absorbing tablets can be produced at any time, and it is no longer necessary to store up a large supply to take care of requirements over the humid summer months.

Furthermore, there is no longer any loss of product by discoloration from storage, and tablets may be delivered to dealers absolutely fresh.

The cost of dehumidification, even under the severest conditions, never runs more than 13½¢ per hour, including cost of gas, current for the motor, and cooling water.

✦

Manufacturer of electric refrigerators reduced rejects of certain parts by 70 per cent when an improved type of air filter was installed in the make-up air supply system for the spray room. Saving is several thousand dollars a year.

Switch to Exhaust Steam Saves $8,000 a Year

Results of a study of steam requirements and consumption made with the help of flow meters enabled a large paper mill to utilize the exhaust steam from an engine in the bleaching machines, whereas live steam had formerly been used for this purpose.

Savings from this change alone amount to more than $8,000 a year, and have repaid the entire cost of all of the boiler control and other instruments used.

Boiler Instruments Save 11 Cars of Coal a Year

Two boilers supplying power and process steam to a small Western meat packing plant formerly burned an average of one car of coal in seven days. In order to check the efficiency of operation and provide better conditions, boiler control instruments were installed. Coal consumption quickly dropped to one car in nine days, representing a saving of eleven cars of coal a year.

At the price that was being paid for coal, the cost of the boiler control instruments was returned in eight months.

Cuts Drying Time, Saves 25% Labor

When leather is dried in open air, anywhere from 12 to 48 hours or more are required, depending on the kind of weather encountered. Under such conditions uniformity of the product is not always easy to obtain. And, of course, a large but varying amount of floor space is required if any considerable quantity of leather is being handled.

To overcome these disadvantages a large shoe manufacturer now dries all leather under close temperature and humidity control. The leather to be dried is folded over bars on a con-

veyor which carries it through a drier. In this drier the leather is subjected to a constant temperature of 130 degrees Fahrenheit and relative humidity of 30 per cent. It requires 3 hours for the conveyor to pass through the drier. At the end of this period the leather comes out properly dried, and of better quality than was formerly obtained in 12 to 48 hours of drying under natural atmospheric conditions.

After the mulling operation the hides are tacked on pivoted boards and thoroughly dried by warm dehumidified air. This operation requires about 14 hours.

It is estimated that the saving in time ranges up to 34 hours, in addition to which there is a 25 per cent saving in labor.

Steam Engine Pays for Itself in 7 Months

A steam engine drives a forced draft fan in the plant of a confectionery manufacturer at a cost of 0.325¢ per kilowatt-hour. With motor drive, the cost of power for this application is 0.88¢. The engine is fully loaded, but only 75 per cent of the exhaust steam is used for process.

A power consumption of 502,000 kilowatt-hours is incurred in operating the fan more than 8,700 hours per year. Therefore, the saving is more than $2,700 per year. Cost of the engine installed was $1,543, which is returned at the rate of 180 per cent a year. This rate of return is sufficient to pay for the engine in 7 months of operation.

Boosted Efficiency, Saves $2,000 per Month

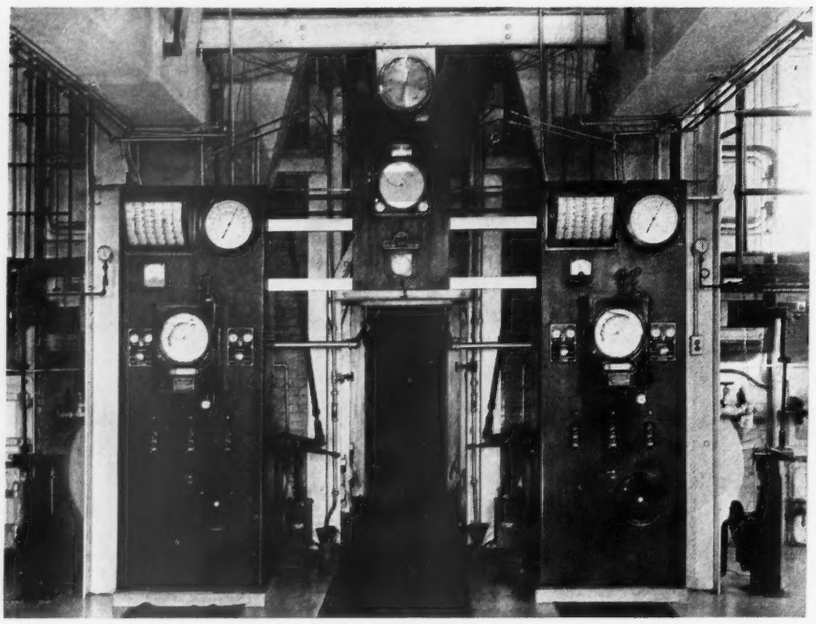
Efficiency in the new power plant operated by a large chemical company was high, but the installation of boiler control instruments boosted it still higher—to 75 per cent. At this level the saving over previous operating costs amounts to $2,000 per month.

Air Conditioning Adds 50% to Plant Capacity

Prior to the installation of air-conditioning equipment, a large printing company was compelled to stop work on days when natural humidity and temperature exceeded certain limits. Now, with the ability to maintain continuously the desired temperature and humidity conditions, production is uninterrupted, and the uniformity and quality of the work have been improved.

Of equal or greater importance is the fact that the ease of operating the existing plant at full capacity eliminated the need for increasing the size about 50 per cent, to take care of production requirements.

AUTOMATIC COMBUSTION CONTROL RETURNS 122%



Fuel savings attributed to automatic combustion control at the Brooklyn plant of American Molasses Company, amounted in 1937 to 976 tons of coal or $4,967. The cost of the control was $4,056, which means that a return of 122 per cent was realized during the first year of operation. This installation was made on two pulverized-coal-fired integral furnace boilers of 42,000 pounds per hour capacity, operated at 240 pounds pressure. The boilers were first operated manually in accordance with the meter readings. After a year of manual operation, automatic combustion control was installed with a resulting increase of 0.692 pounds of steam evaporated per pound of coal

50% More Steam, Yet Costs Are Down

Quick profits were realized by Adolph Seidel & Sons Company, Aurora, Ill., in the manufacture of preserves by installing a gas-fired, horizontal, immersion-tube boiler.

This company was operating a 6-hp. vertical gas boiler and wanted to increase production 50 per cent. The local gas company recommended the new horizontal immersion-tube boiler. Therefore a 15-hp. unit was installed to replace the old boiler, and production was increased 50 per cent.

It was found that the monthly gas bill actually dropped a dollar or two per month despite the increased size and output of the new boiler.

This type of unit boasts high thermal efficiency (up to 83 per cent) because (1) the entire length of the fire tubes is kept below water level for maximum heat removal from the hot products of combustion, and (2) the flue gases are exhausted from the fire tubes at about the same level as that at which the gas is burned, thus minimizing cooling through drafts of cold air during the off cycles.

✦

A plant manufacturing electrical equipment installed an automatic control to regulate flow of water through its water-cooled air compressors. Formerly regulated by hand control, the waste water was being sent to the sewer at a temperature of 60 to 85 degrees Fahrenheit. The new control automatically holds it at 125 degrees. As a result, consumption of cooling water has been cut 40 per cent, and the efficiency of the compressors has been increased.

How Employee Efficiency Is Increased by This NEW COLD Fluorescent Lighting

A New Lower Cost Way of Obtaining the Higher Levels of Illumination Necessary to Improve Workmanship and Employee Morale

Fluorescent Lighting provides management with a new opportunity to improve plant "Seeing Conditions" and thus improve accuracy of workmanship production, employee morale, safety and all-round efficiency.

Scientific laboratory tests and practical plant experience have demonstrated that when plant "Seeing Conditions" are improved by raising the levels of illumination and improving the quality of the light, seeing speed is increased and eyestrain and eye fatigue are reduced to a minimum. See Data Sheet No. 11 as published in FACTORY MANAGEMENT & MAINTENANCE, October, 1939.

A New Advance in Better Lighting

Fluorescent Lighting marks the attainment of a long sought goal. It makes possible higher levels of unusually fine quality light at lower cost. It enables you to obtain a light of accurate daylight quality and secure higher intensities without annoying glare or heat. Full advantage of this new light for both general and localized lighting may now be had through the installation of Benjamin Lighting Units especially designed for the 36″ and the new 48″ Fluorescent daylight and white light lamps.

A New Type of General Lighting

In the early development of Fluorescent Lighting its application was confined chiefly to localized lighting. Now with the introduction of the new Benjamin "STREAM-LITER," efficient and economical Fluorescent Lighting is available for the first time for general illumination.

Only by first hand experience can the daylight quality, comfort and softness of this new diffused lighting be fully appreciated. It is truly one of the most important advances ever made in general overhead lighting.

Due to the higher light output of the Fluorescent Lamps, and the high efficiency of Benjamin Fluorescent Lighting Units, this new, fine lighting usually can be obtained at a lower operating cost than that formerly required to secure comparable results.

New Solution to Local Lighting Problems

It is now practical to mount high intensity lighting units, delivering 100 to 150 foot-candles, close to the working plane of inspection tables, production lines, assembly benches, etc. Never before has it been possible to provide such high intensity lighting without annoying glare and annoying heat. Because the light generated by the Fluorescent lamp is cold light, there are no annoying heat radiations. Because these lamps have an exceptionally low brightness factor, glare is reduced to a new low minimum. Because the light source is long, it is ideal for localized lighting.

Color Corrections

For operations involving color, an economical light of exceptionally fine daylight quality can be obtained through the use of Benjamin Fluorescent Units with daylight lamps. This light is produced without the use of the filters which heretofore have been necessary to produce "daylight" with the ordinary incandescent lamp. The heavy light loss from filters is thus eliminated.

Approved by Underwriters' Laboratories

These and other Benjamin Fluorescent lighting units are ruggedly constructed, easily installed and maintained, give the highest light output efficiency, and are warranted to comply with all recognized electrical, illumination and mechanical standards. They are approved by Underwriters' Laboratories as evidenced by the inspection label affixed to each unit.

Make Needed Changes Now

Does your lighting meet present day requirements for increased production, higher inspection standards, overtime or extra shifts? A Benjamin Lighting Specialist will be glad to make specific recommendations. By training and experience he is an expert in industrial lighting and his services are available to you without cost or obligation.

Send for These New Bulletins

Complete information on Benjamin Fluorescent units is contained in Bulletin No. 600. Your return of the coupon below will bring you this bulletin now and place your name on our list to receive new Bulletin No. 610, now in preparation.

The Low Brightness Quality of the Fluorescent Lamp is combined with the unexcelled Diffusion Quality of Porcelain Enamel in the New, Low Cost

BENJAMIN STREAM-LITER

Designed specifically for general industrial lighting. Uses two 48″ Fluorescent Lamps. The porcelain enamel reflector with 72½° cut-off shields lamps. New type auxiliary and starting switch; corrected for power factor and flicker. Uses approximately 100 watt. Provides 15 to 25 foot-candles on working surface. Available after December 15, 1939.

NEW BENJAMIN FLUR-O-LITER

Provides 75 to 150 foot-candles when mounted locally over inspection tables, production lines, or work benches. Also adapted to higher mountings. Uses two 48″ Fluorescent lamps with individual Alzak aluminum reflector enclosed in steel housing. New auxiliary and starting switch; corrected for power factor and flicker. Available after December 15, 1939.

Other units for the 18″, 24″, 36″ lamps and for single 48″ lamps now available.

BENJAMIN
TRADE MARK
LIGHTING EQUIPMENT

Distributed Exclusively Through Electrical Wholesalers

BENJAMIN ELECTRIC MFG. CO., Des Plaines, Illinois.
Gentlemen:

☐ We are interested in data to show how our lighting may be improved. Please send us your Bulletins No. 600 and 610.

☐ We would like to arrange for a FREE DEMONSTRATION.

Name.....

Title.....

Firm.....

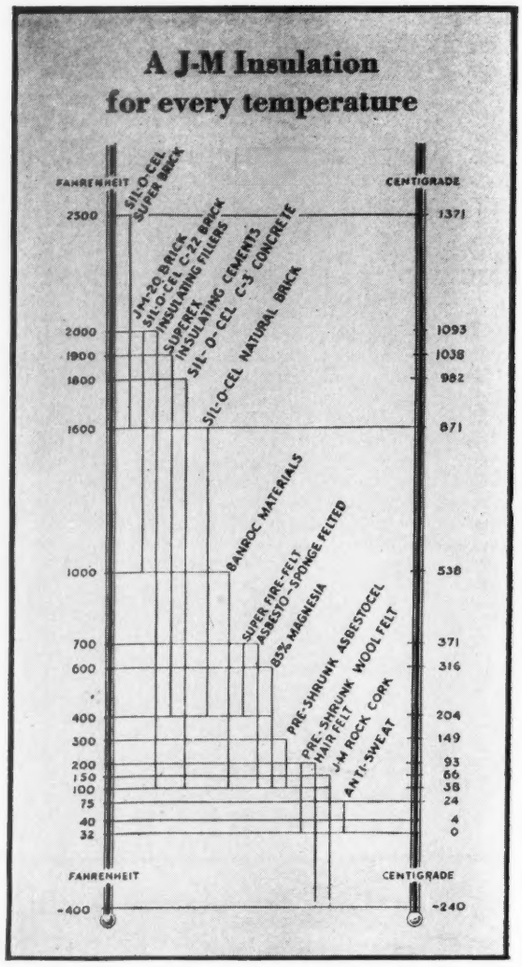
Address.....

City.....*State*.....

ANY INSULATION WILL SAVE YOU MONEY...

BUT WHICH WILL SAVE THE MOST?

Only the right material in the most economical thickness will give you complete protection against excessive fuel losses



EVEN the wrong type or thickness of insulation will save you *some* money. But the amount is small compared to the savings made by applying the *correct materials* in the *correct thickness.* You can get *all* the savings that insulation can give with the help of the Johns-Manville Insulation-Engineering Service.

Johns-Manville offers a complete line of insulations in brick, block and pipe-covering form for every temperature and service condition. J-M Engineers will be glad to work on any problems you may have . . . apply to them Johns-Manville's 81 years of intensive research and practical experience in the insulation field. These men will tell you exactly what material provides greatest operating efficiency . . . just what amount will pay the greatest return on your insulation investment.

Hundreds of plants all over the country have used this helpful J-M Service to secure better temperature control . . . maximum fuel savings. Why not let a trained J-M Engineer make a complete study of your requirements? For full details and complete information on J-M Industrial Insulations, write for Brochure IN-55-A. Johns-Manville, 22 East 40th Street, New York City.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville INDUSTRIAL INSULATIONS

For every temperature...
For every service condition

REDUCE YOUR FUEL COSTS IN 1939

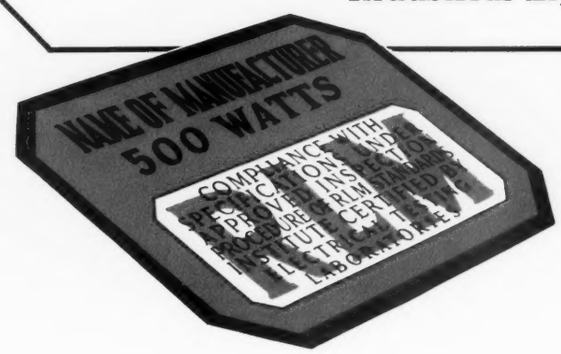
Announcing

HIGHER LIGHT REFLECTION and OUTPUT

Specifications for the

RLM DOME REFLECTOR

The most universally used of all Industrial Lighting Reflectors



Again—More Light at NO EXTRA COST

As a result of careful engineering study, research and tests, the RLM Specifications for light output efficiency in the RLM Dome Reflector again have been increased. Thus the RLM Label on industrial lighting reflectors becomes of even greater value in assuring the purchaser of MORE LIGHT AT NO EXTRA COST.

The new RLM Specifications establish a new high mean reflection factor for the porcelain enamel reflecting surface and a new total light output factor of 78%! All RLM Dome Reflectors now being manufactured meet with these new high efficiency specifications.

This announcement is particularly important because it concerns the Dome type lighting reflector. This reflector because of its special characteristics and wide application for the Better Lighting of plants, warehouses, platforms, docks, etc., is the most frequently used reflector in modern industrial lighting.

Important factor in the popularity of the RLM Dome Reflector is the fact that it is an all-porcelain enameled reflector. Porcelain Enamel's high lighting efficiency, high diffusion and light distribution, durability and long life have made it the most practical and most satisfactory of all known reflecting surfaces for most industrial lighting purposes. Porcelain Enamel Reflectors have been proven by decades of use. They are unaffected by atmospheric conditions obtaining over practically the entire range of industrial processes. Non-porous, easily cleaned and restored to original efficiency, fade-proof, and non-peeling, Porcelain Enamel Reflectors made in accordance with RLM Specifications assure not only highest lighting efficiency but lowest maintenance costs.

For a complete discussion of the four essentials of proper Light Conditioning assured by the RLM Label, (1) Balanced Lighting; (2) Low Cost Maintenance; (3) More Light at No Extra Cost and (4) Warranty of Uniform Quality, you are invited to write for a complimentary copy of the Booklet "The Meaning of the RLM Label."

The letters RLM stand for Reflector and Lighting Equipment Manufacturers

RLM STANDARDS INSTITUTE
INCORPORATED

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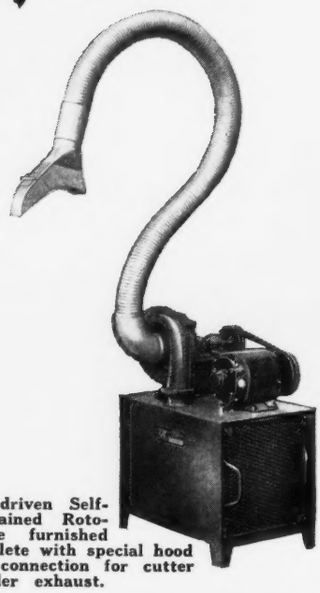
THE CERTIFICATE OF RLM UNIFORM QUALITY

ROTO-CLONE
Process Dust Control Systems

SOLVE INDUSTRY'S NEEDS FOR

GRINDING CUTTING BROACHING
POLISHING CRUSHING PULVERIZING
PROCESSING CONVEYING MIXING

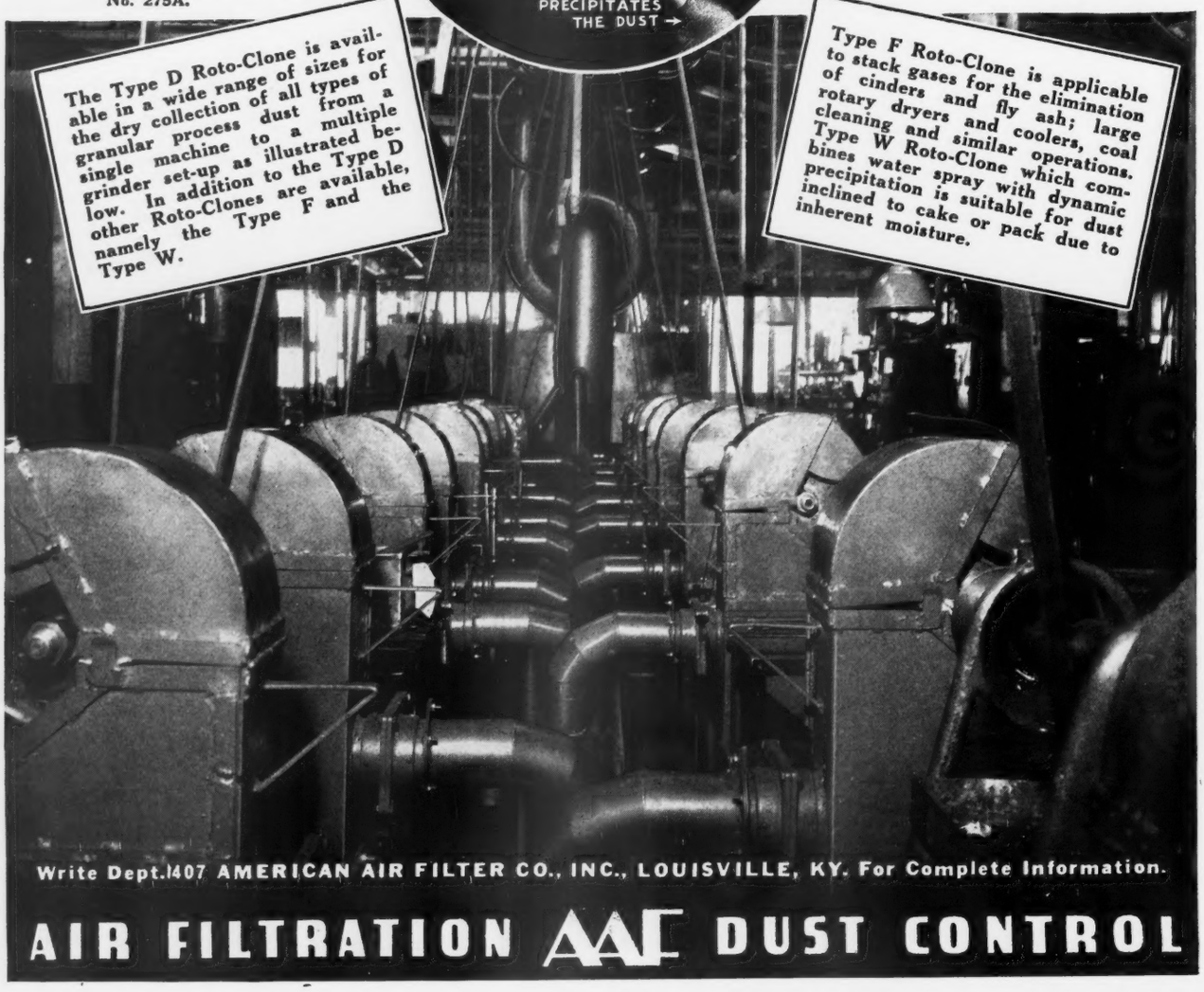
Direct driven Self-Contained Roto-Clone collecting from a surface grinder. Write for Bulletin No. 275A.



Belt-driven Self-Contained Roto-Clone furnished complete with special hood and connection for cutter grinder exhaust.

The Type D Roto-Clone is available in a wide range of sizes for the dry collection of all types of granular process dust from a single machine to a multiple grinder set-up as illustrated below. In addition to the Type D other Roto-Clones are available, namely the Type F and the Type W.

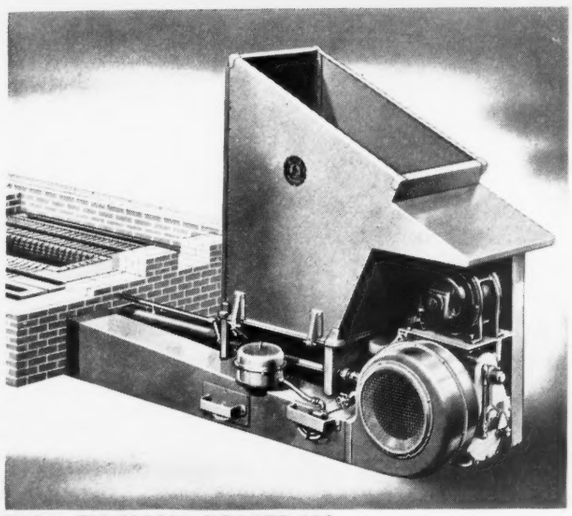
Type F Roto-Clone is applicable to stack gases for the elimination of cinders and fly ash; large rotary dryers and coolers, coal cleaning and similar operations. Type W Roto-Clone which combines water spray with dynamic precipitation is suitable for dust inclined to cake or pack due to inherent moisture.



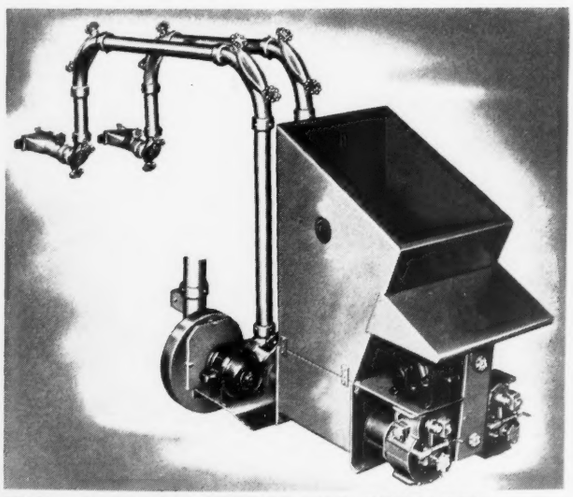
Write Dept. 1407 AMERICAN AIR FILTER CO., INC., LOUISVILLE, KY. For Complete Information.

AIR FILTRATION AAF DUST CONTROL

Iron Fireman will dig QUICK PROFITS from your coal pile



IRON FIREMAN *POWERAM* World's standard of value in power stokers. Combines the best features of both ram-feed and worm-feed stokers . . . the Poweram transports coal to retort with a worm conveyor, and distributes coal within the retort by means of ram-blocks.



IRON FIREMAN PNEUMATIC SPREADER A type of stoker developed by Iron Fireman engineers . . . now producing some of the greatest savings records in American industry. Conveys coal from hopper (or bunker) on a stream of high-velocity air. Fine particles burn in suspension; larger pieces burn in a shallow layer on the grates. Burns efficiently many low-grade, low-cost coals which cannot be fired by any other type of stoker.

Can you afford to WASTE what Iron Fireman users are SAVING?

How many *tons* of coal a year are you throwing away—sending up the stack in wasted B.t.u.'s? And how many *dollars* are you wasting by firing the more expensive grades and sizes of coal? Thousands of steam plant operators have found that they get *more B.t.u.'s per fuel dollar* with Iron Fireman firing . . . they obtain highest combustion and efficiencies, with *inexpensive* grades and sizes of coal. The cash savings of Iron Fireman users total millions of dollars a year. Put an Iron Fireman to work digging profits from *your* coal pile!

Among the prominent users of Iron Fireman stokers

American Telephone & Telegraph Co.
American Tobacco Co.
Beatrice Creamery
Borden Company
Chesapeake & Ohio Railroad Co.
Chicago Bridge & Iron Company
Coca Cola Bottling Companies
Continental Baking Co.
Cooper-Bessemer Corporation
Crane Co.
Erie Railroad
Firestone Tire & Rubber Company
Ford Motor Company
General Chemical Co.
General Electric
International Harvester Company
Jenkins Bros.
Kennecott Copper Co.
Kraft Cheese Company
The Libby Company
Liggett & Myers Tobacco Co.
Mack Truck Co.
New York Central R. R.
Oliver Iron Mining Company
Pittsburgh Plate Glass Company
Pro-Phy-Lac-Tic Brush Co.
Prudential Life Insurance Co.
Pure Oil Company
Purity Baking Company
Republic Steel Company
Sahara Coal Company
Sheaffer Pen Co.
The Sherwin-Williams Company
Singer Sewing Machine Company
Standard Oil Company
Texas Co.
Union Carbon and Carbide Co.
Union Pacific Railroad
U. S. Steel Corporation
U. S. Vanadium Company
Universal Sanitary Mfg. Co.
Western Electric Co.
Westinghouse Electric Supply Company

Read how representative plants are collecting QUICK PROFITS with Iron Fireman firing ⇨

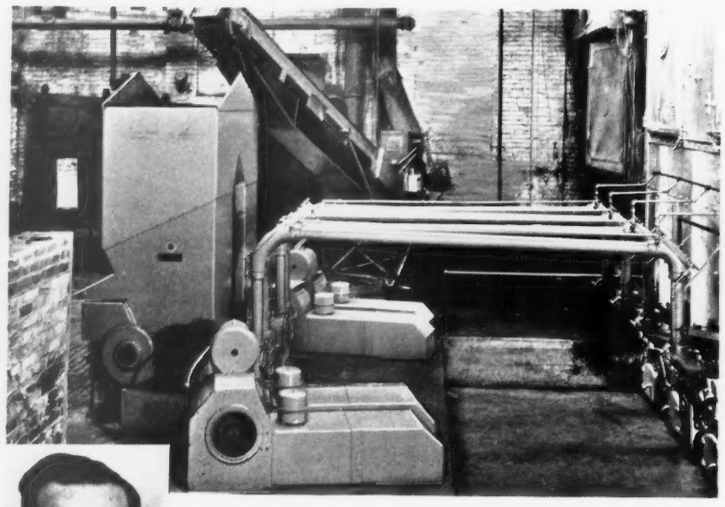
Could you afford to waste what BOWSER is saving?

IRON FIREMAN SAVES $5300 A YEAR

S. F. Bowser & Company, Inc., quit hand-firing expensive coals, and installed two Iron Fireman dual-feed Pneumatic Spreaders, with a maximum coal feed of 4800 pounds an hour. Fuel cost per thousand pounds of steam (adjusted for price change in coal market) dropped from 29.2c with hand-firing, to 18.3c with Iron Fireman firing—a reduction of 37%. Fuel and labor savings amount to $5300 a year. Fuel is now purchased from a wide range of nearby low-cost coals. Smaller sizes, such as 1/2" to 0, are efficiently fired.

E. Goette, Bowser plant engineer, reports: "With the stokers located 12 feet from the boiler front, there is good accessibility to the furnaces for inspection and cleaning of fires."

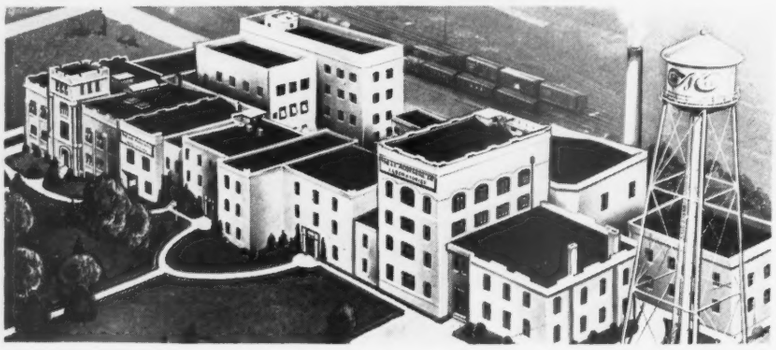
The Bowser winter steam load is 60% heating and 40% power and process. The Iron Fireman Pneumatic Spreader, highly flexible in operation, holds pressure level in spite of fluctuating load.



Boiler room of Bowser plant, Fort Wayne, Ind., manufacturers of liquid-control equipment. Coal is conveyed on streams of high-velocity air to four adjustable nozzles within front wall of boiler. Coal is distributed evenly over 108 square feet of grate area; fines burn in suspension. Boiler rating, 750 horsepower. Left: E. Goette, engineer.

Could you afford to waste what MASSENGILL is saving?

Above, from left: Dr. S. E. Massengill, board chairman of the company; "Sheriff" Weaver, engineer, and L. O. Caldwell, Iron Fireman representative, in one of the Massengill boiler rooms. Below: The famous pharmaceutical laboratories of the S. E. Massengill Company in Bristol, Tennessee-Virginia.



IRON FIREMAN PAYS 39% ANNUAL RETURN

"The purchase of Iron Fireman stokers has been the soundest and most profitable equipment investment we have ever made," declares S. E. Massengill, board chairman of the S. E. Massengill Company, leading manufacturing pharmacists.

"We installed our first two Iron Fireman stokers in 1929—and these are now completing their 10th year of service. Since then we have purchased ten other Iron Fireman burners. The entire group has given 50 years' combined service—and the total service cost has been a trifling $29.20 for repairs to a motor.

"Iron Fireman does a heavy-duty job in our boiler plant. With hand-firing, our plant was loaded to capacity. Then we erected a new five-story laboratory, with several new dryers, sterilizers and distilling equipment. And Iron Fireman carried the much-increased load with no increase in fuel tonnage!

"We compute our fuel and labor savings as being equivalent to a 39% return on our investment. And the evenness of steam pressure, the elimination of smoke, fuel savings and labor savings each justify the installation cost."

AUTHORIZE IRON FIREMAN TO MAKE A

Could you afford to waste what PATTERSON is saving?

IRON FIREMAN POWERAMS PAY FOR THEMSELVES IN FIRST 59 WEEKS!

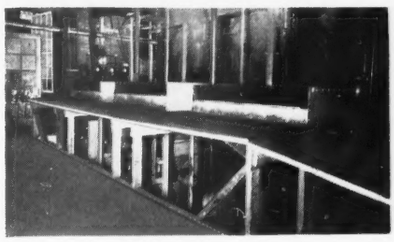
The Patterson Mills previously hand-fired its three boilers at a fuel cost per thousand pounds of steam of 35 cents. Iron Fireman Poweram firing reduced this cost to 20.8 cents. Further, Iron Fireman has lowered labor expense. Fuel and labor savings every year amount to 87% of the original cost of installing Iron Fireman, which means that this equipment pays its original cost every 59 weeks.

Besides this astounding economy, Patterson Mills now has greatly improved steam control and is able to maintain much more constant steam pressure to meet the requirements of its processing load.

These fuel and labor savings are the equivalent of a return, on each $1000 invested, of $870 every year!

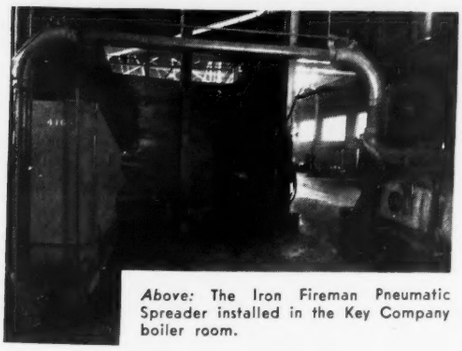
"Naturally we are pleased," says F. C. Williams, vice-president and manager of the Patterson Mills Company, Inc.

(Above) Patterson Mills, Roanoke Rapids, N. C. (Below) The three Iron Fireman Powerams in the boiler room of the Patterson Mills. Note the special construction which facilitates loading of the stoker hoppers.



Could you afford to waste what KEY is saving?

A corner of the Key Company plant in East St. Louis, with administration building in the foreground.



Above: The Iron Fireman Pneumatic Spreader installed in the Key Company boiler room.

IRON FIREMAN PAYS $1177 IN FIRST YEAR

During its last year of hand-firing, the Key Company of East St. Louis, leading maker of refinery and power plant equipment, burned $2437 of coal. The next year, with Iron Fireman Pneumatic Spreader firing, fuel costs *dropped to $1260.* This is a reduction of 48%, a *cash profit of $1177.*

Says M. E. Burkhart, chief engineer of the Key Company: "There are factors other than price to be considered, such as time saved by Iron Fireman in stoking, ash disposal, etc. . . . but the above figures are sufficient to convince us that the Iron Fireman installation was one of the best investments we ever made."

ENGINEERING SURVEY OF YOUR STEAM COSTS

SEE NEXT PAGE

IRON FIREMAN
offers to make an engineering survey of your steam costs

Eliminate guess-work from firing-equipment purchases

Let's sit down at a table—you on one side and Iron Fireman on the other—and look at the arithmetic on your boiler operation. We will lay before you an engineering report on your steam costs. This report will contain full facts and figures on what Iron Fireman firing can accomplish in your boiler room. Taking into consideration your steam load, load cycle, local fuel situation, etc. . . . . this Iron Fireman engineering report will give you a conservative estimate of your fuel costs with Iron Fireman firing compared with your present costs. The report will estimate your potential savings in firing room labor; estimate the various betterments and advantages you may expect, and include a rock-bottom quotation on an Iron Fireman installation.

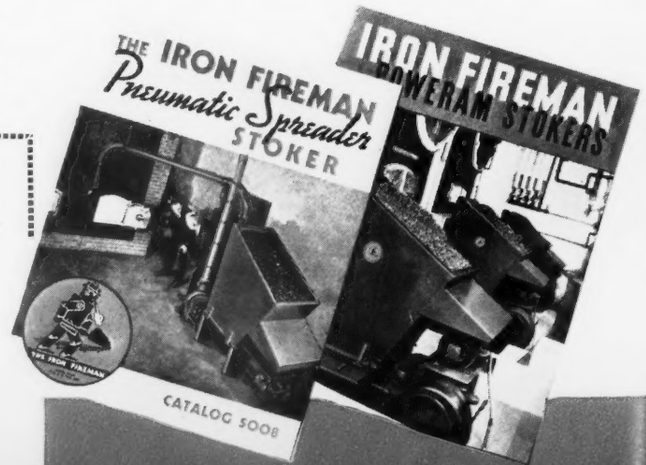
Your survey will be supervised by the Iron Fireman Engineering Department—an organization which has engineered more industrial stoker installations than any other group in the world. We offer to make an Iron Fireman Engineering Survey at our own expense. We will make it in cooperation with your own engineer, consulting engineer, or fireman. To obtain this report, mail the coupon below.

Consider placing Iron Fireman in your 1940 budget. Iron Fireman will step up operating efficiency to a new high—and at the same time will dig substantial profits from your coal pile.

Note: A recent independent canvass of American industries shows that Iron Fireman commercial-industrial stoker installations outnumber the next leading make *by more than two-to-one.*

Mail coupon now for these catalogs

We will gladly mail you these two catalogs, which clearly describe the construction and operation of the Iron Fireman Poweram underfeed stoker, and of the Iron Fireman Pneumatic Spreader overfeed stoker.



IRON FIREMAN MANUFACTURING COMPANY
Portland, Oregon; Cleveland, Ohio; Toronto, Ontario.
Mail to 3170 West 106th Street, Cleveland, Ohio.

..... See us about making an Iron Fireman Engineering Survey of our steam costs. We understand we are not obligated in any way.

Send ..... Poweram Catalog.

..... Pneumatic Spreader Catalog.

Name.....

Company.....

Address.....

Better check with WIREMOLD

Intensity 8-10 ft. candles on needles.

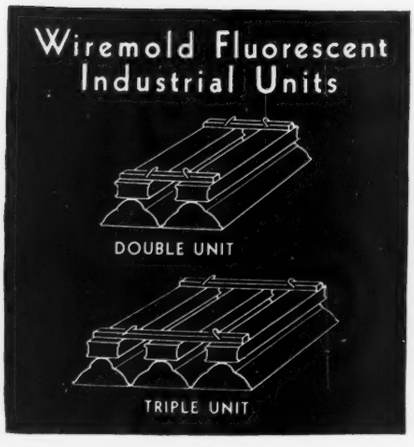
Unretouched photograph showing Hosiery mill before installation of Fluorescent Lighting.

Unretouched photograph showing the same mill after installation of Fluorescent Lighting with No. 3000 strip and reflectors.

Intensity 65 ft. candles on needles.

Wiremold Fluorescent Lighting Equipment and Fittings are listed by The Underwriters Laboratories, the Hydro-Electric Power Commission of Ontario, Canada and The Electrical Testing Laboratories, New York.

Before you install FLUORESCENT LIGHTING



There's a very definite IDEA back of what Wiremold is doing in this broad new field. That idea is to give contractors, lighting engineers and users the kind of Fluorescent Lighting Equipment that will enable them to apply the new light source for LASTING efficiency and economy *on each individual installation.* Fluorescent Lighting offers you important advantages but these can only be realized to the full by correct engineering and application of approved equipment.

There are many ways in which Wiremold Fluorescent Lighting and other Wiremold Systems can speed work, reduce maintenance and cut costs in your plant.

Send for this new Wiremold Industrial Folder

THE WIREMOLD COMPANY - HARTFORD, CONN

ADEQUATE WIRING SERVES AND SAVES

Get to know WIREMOLD

Quick Service through Electrical Contractors everywhere

"No, Phil, I never have.
And I bet that it pays you many times over!"

YES, ridding the plant of dangerous dust or fumes does pay big in employee health and comfort. But, in addition, it also returns dividends of increased efficiency, longer lasting equipment, and cleaning cost cuts.

If you have a dust or fume condition in your plant which is causing you concern — we invite you to consult us. We will gladly give you our fullest cooperation — and make available our many years of experience.

As to the definite advantages which a Fume or Dust Removal System of Sturtevant design offers you: — (1) it provides a system exactly suited to your specific requirements; (2) assures the advantages of low power consumption and space economy; (3) incorporates the design and construction refinements resulting from Sturtevant's 75 years of air engineering experience.

Write briefly, describing your problem, and our nearest office will promptly respond.

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Hyde Park, BOSTON, MASS. *Branches in 40 Cities*
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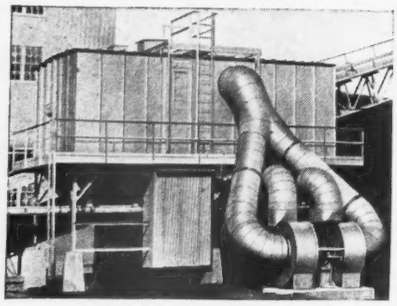
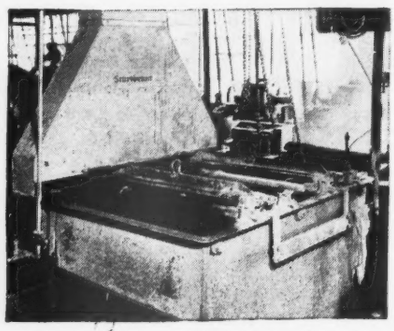
Galt, Toronto, Montreal

Sturtevant
REG. U. S. PAT. OFF.
Puts Air to Work

Photo courtesy of Pangborn



Sturtevant Exhauster for removing dust formed in the manufacture of roofing material at Staso Milling Co., Bound Brook, N. J.



Sturtevant Exhaust System for cyanide tank.

FOR DUST AND FUME REMOVAL

Make This Issue WORK FOR YOU

This issue of FACTORY has hundreds of ideas—to help you reduce operating costs. These ideas are useful only if you put them to work.

Here's what typical readers told us of FACTORY'S previous "Quick Ways to Profits" issues:

"I checked 27 items that I am sending out to 14 persons in our organization for their consideration."

"I am passing this issue on to operating men in my department, asking them to list 10 specific items that they think will be helpful to our operation."

"I am in the midst of reviewing the issue in detail myself, after which I propose to hand the issue to our Methods Department and ask them to check each section."

"I have found this issue most interesting. I sat down of an evening and read it from cover to cover just like a gripping novel. Many of the sections that apply to our problems I marked and then passed the magazine on its rounds through the factory."

"I should like very much to have another copy of the November issue, as I intend to make clippings of the one I now have and route the different sections to the heads of the departments who would be most interested."

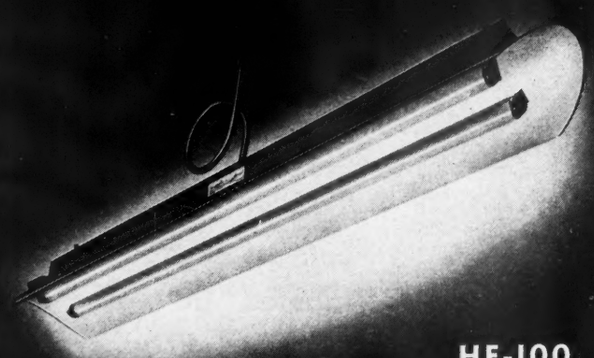
"We would like to get several copies of the November issue of FACTORY. These are to be used in mill council meetings in our nine plants."

READY! Industry's first complete FLUORESCENT DAYLIGHT UNIT

Modernize your plant!

A COMPLETE LIGHTING UNIT—A LIGHTING MIRACLE—AMAZINGLY EFFICIENT—GIVES SEVERAL TIMES THE LIGHT—ENDS HARSH SHADOWS—CUTS HEAT ONE-HALF—NO COSTLY RE-WIRING!

JUST HANG IT UP—AND PLUG IT IN—



HF-100

FLOODS OF DAYLIGHT

Amazingly efficient—produces floods of cool controlled daylight at moderate cost. Comes complete with 2 *standard* HYGRADE 40 Watt, T-12 Fluorescent Lamps all ready to hang up and plug in.

NO picture or description can do justice to the amazing efficiency of this miraculous new light. Our complete lighting unit, engineered and designed particularly for industrial use. Corrected for power factor and stroboscopic effect. Simply hang it up and plug it in any 60 cycle AC circuit. Overall wattage of unit is approximately 100 watts.

Ideal for obtaining high levels of general illumination efficiently and economically. Rugged construction of unit and long life of lamps insures low maintenance cost.

If you are interested in lighting economy—in increased production—decreased spoilage—fewer accidents—get in touch with your local HYGRADE jobber, or use the coupon for more facts about HYGRADE Fluorescent.

CLIP TODAY!

Hygrade Sylvania Corporation
Salem, Mass.
I am interested in Hygrade Fluorescent Lighting Unit HF-100.
I want prices, discounts, full information.

Company_____
Individual_____
Address_____
City and State_____

LOW COST — Hygrade — FULL LIFE — MORE LIGHT

Hygrade *Fluorescent* Lamps

Hygrade Sylvania Corporation Est. 1901

MAKERS OF SYLVANIA RADIO TUBES AND HYGRADE INCANDESCENT LAMPS

Put this FREE HEAT (ordinarily wasted heat) to use—with Wing Featherweight UNIT HEATERS

Floodlights of Heat

This new heater with a discharge that slowly revolves creates such an active state of air turbulence, without drafts, that it produces an entirely new sensation of fresh, live, invigorating, comfort-giving heat.

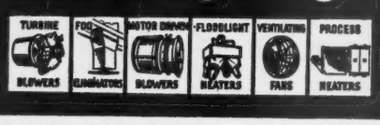
In 1922, Wing pioneered lightweight suspended unit heaters and the circulation of warm air vertically downward from overhead spaces, preventing overhead heat accumulation and attendant waste. That this principle was correct is proven by the fact that today, suspended heaters are used in more than 95% of all industrial heating installations.

The original Wing Featherweight Unit Heater (1922), was designed to improve heat distribution. Multiple discharge outlets accomplished this.

This new heater with a discharge that slowly revolves assures still more perfect heat distribution. Even in plants where equipment or other objects obstruct the flow of heat from fixed discharges, complete coverage to walls and remote corners of the plant is easily accomplished.

Write for Bulletin H-6AB

L. J. Wing Mfg. Co.



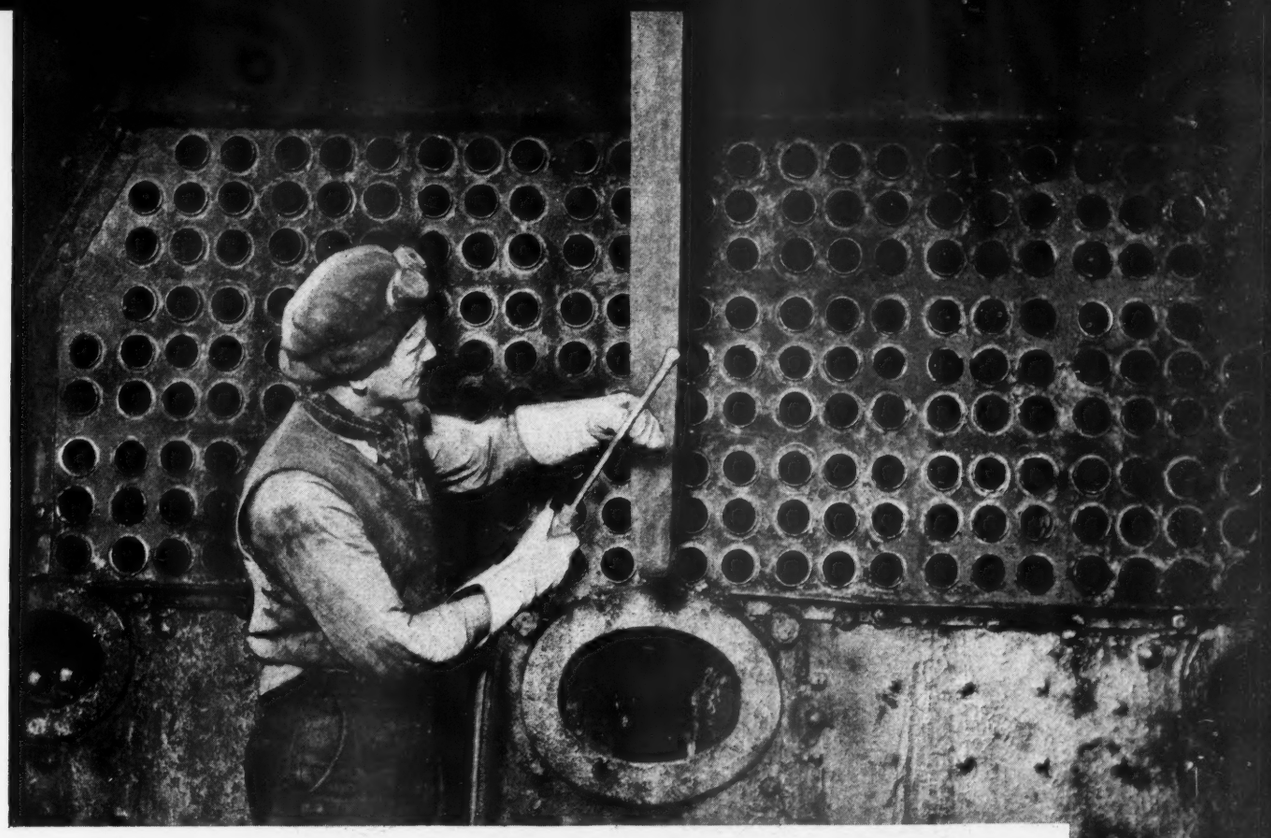
162 W. 14th St., New York, N. Y.

Getting Your Money's Worth?

A recent letter from an important plant executive tells how FACTORY is used in his plant:

"The popularity of FACTORY is attested by the fact that it enjoys the largest circulation of any magazine from our private company library (including private subscriptions) from among over 70 technical and business magazines distributed to our executives. Progressive thought, constructive editing, and adequate illustrations are a great aid to any man whose job it is to help run industry's plants or factories".

Read FACTORY Regularly For Profitable Ideas On How To Cut Costs and Increase Profits.

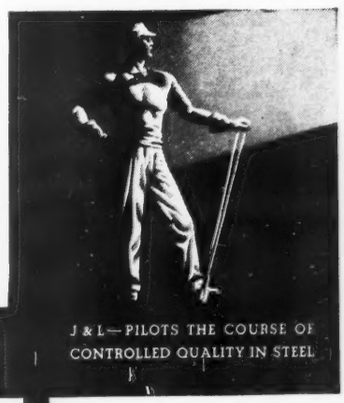


ANOTHER USER SAYS "THE EXTREME DUCTILITY OF J&L SEAMLESS BOILER TUBES MAKES THEM EASY TO INSTALL"

The Olson Water and Towing Company, New York City, operates a fleet of six steamers. Naturally their operations depend upon keeping these boats on the job. So when boiler repairs are necessary, they want the work completed quickly and economically. That's why this company uses J & L Seamless Steel Boiler Tubes.

Mr. John G. Olson, general manager, writes: "We have previously installed your tubes in several of our tow boats and have always found them to be entirely satisfactory in every respect. The boiler makers recommended J & L tubes very highly because of their extreme ductility which makes installation very easy.

J & L Seamless Boiler Tubes are safe and dependable. Their longer life and increased efficiency keep boilers on the job. Your J & L distributor has a complete line of J & L Seamless Tubes. He is listed in the Classified Telephone Directory under "Boiler Tubes." Call him for quick service. Write today for a copy of our Boiler Tube Bulletin.

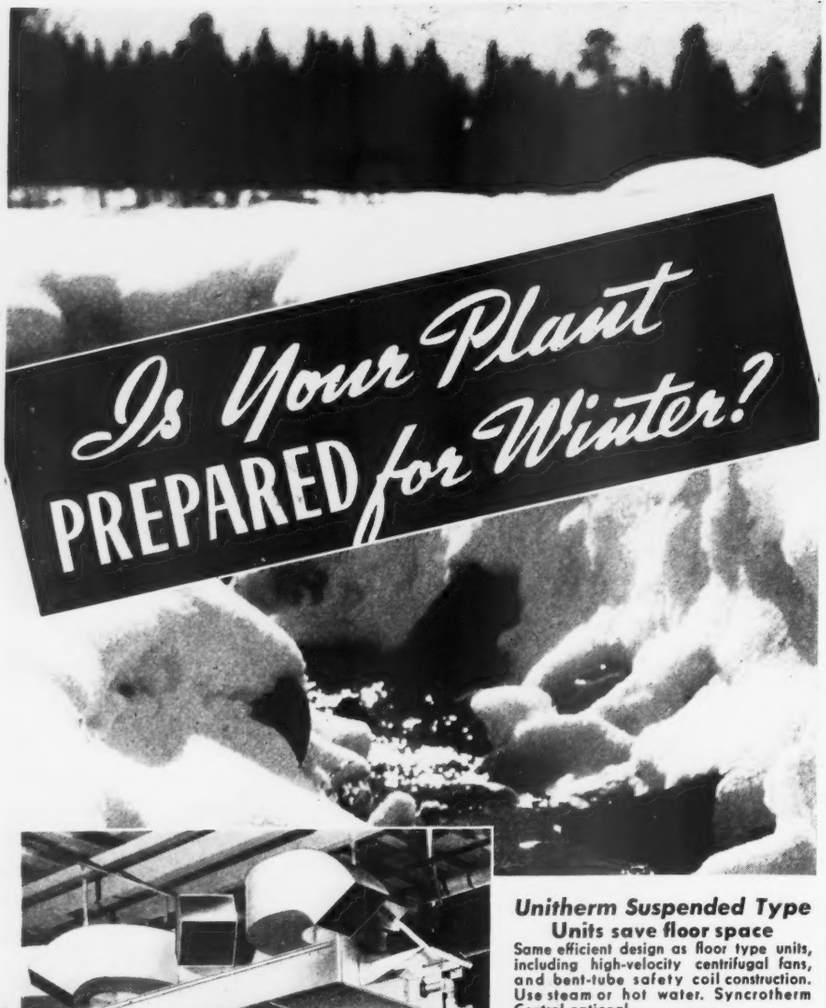


JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA

J&L STEEL

J & L—PARTNER IN PROGRESS TO AMERICAN INDUSTRY



Unitherm Suspended Type Units save floor space
Same efficient design as floor type units, including high-velocity centrifugal fans, and bent-tube safety coil construction. Use steam or hot water. Syncrotherm Control optional.

Unitherm Floor Type Units

Cut Heating Costs *with* CLARAGE *UNIT HEATERS*

Plenty of heat—where you want it—when you want it! And at amazingly LOW COST, because of Clarage Syncrotherm Control, **a patented feature obtainable only on Clarage Unitherm Unit Heaters.** Three types—over 50 sizes—the RIGHT units for every requirement.

Write today for literature. Learn why shrewd buyers everywhere consider Clarage Units **No. ONE HEATING EQUIPMENT** from a design, construction and performance standpoint.

Suspended Clarco Units are ideal for heating small spaces, or to "help out" present equipment. **Very Quiet** in operation, suitable for offices and stores. Heat controlled by adjustable louvres. Use steam or hot water.

Clarco Unit Heaters are scientifically designed for large area industrial heating, using steam or hot water. Require less piping, fewer traps. Syncrotherm Control optional.

COMPLETE AIR CONDITIONING • COOLING • VENTILATION • FACTORY HEATING • MECHANICAL DRAFT • FANS and BLOWERS for INDUSTRIAL NEEDS

CLARAGE FAN COMPANY—KALAMAZOO, MICH.
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

Offering you

a thorough grounding in the important principles, methods and equipment of

air conditioning

This is a practical, working book that begins at the beginning and gives you step by step the information you want. It presents the very course which the Westinghouse Company gives to men in its Springfield plant.

Air Conditioning in Summer and Winter

By RICHARD E. HOLMES

Design Engineer, Westinghouse Electric and Manufacturing Company

296 pages, 6 x 9, 118 illustrations, $3.00

WRITTEN for technical men who wish to master the essentials of air conditioning. Assumes no previous knowledge of the subject. It starts with a thorough explanation of principles involved, then takes up winter and summer air-conditioning problems and equipment. Throughout the author aims to give a thorough grounding in important aspects of installation, construction and operation from a completely practical, working viewpoint.

Covers such topics as:

—determination of heat-transmission loss;
—application of air filters;
—unit-type room air conditioners;
—refrigeration performance, efficiency;
—summer air-conditioning load example;
—subcooling;
—choosing air-conditioning equipment;
—temperature and humidity controls.

See it 10 days on approval.

McGRAW-HILL ON-APPROVAL COUPON

McGRAW-HILL BOOK CO., INC.,
330 West 42nd St., New York City

Send me Holmes—Air Conditioning in Summer and Winter for 10 days' examination on approval. In 10 days I will send $3.00 plus few cents postage on delivery, or return book postpaid. (We pay postage on orders accompanied by remittance.)

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City and State .....
Position .....
Company FAC-11-39
(Books sent on approval in U. S. and Canada only.)

Locklite

FOR INDUSTRIAL LIGHTING

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RLM STANDARDS INSTITUTE

An exclusive Westinghouse principle that gives these ADVANTAGES:

First: COMPLETE INTERCHANGEABILITY FOR GREATER PRODUCTIVE CAPACITY

LOCKLITE is a definite answer to greater production capacity . . . for any LOCKLITE Reflector will fit any LOCKLITE Hood—regardless of lamp size or Reflector shape. This means that production capacity need not be held up in converting existing plant space to active production—for LOCKLITE Industrial Reflectors, may be exchanged instantly as indicated in the photographs below. Westinghouse Electric & Manufacturing Company, Edgewater Park, Cleveland, Ohio.

2 ***Ease of Installation.*** The Locklite Hood is permanently attached. Reflector with Lamp Holder is attached only after all wiring and general installation work is completed.

3 ***Efficiency.*** The over-all light output, reflection factor of reflecting surfaces, cut off angle, light center position of lamp, diameter and height of reflector conform with R.L.M. Standards specifications.

4 ***Simplified Maintenance.*** A counter-clockwise turn releases Reflector and lamp for cleaning or replacement. All set-screws, levers, threaded necks, etc. are eliminated. A clockwise turn after the Reflector is placed in the Hood assures *positive locking.*

5 ***Greater Safety.*** The lighted lamp is an automatic signal that the Reflector and Hood are firmly attached . . . the LOCKLITE lights as it locks.

High Bay Aluminum | RLM Standard Dome | RLM Standard Deep Bowl | RLM Standard Symmetrical Angle | Shallow Dome | Glassteel Diffuser | RLM Standard Silvered Bowl Diffuser

Westinghouse Lighting Equipment

USE THE COUPONS!

Many advertisers in this issue of FACTORY have not only given you valuable information in their advertisements, but have made it easy for you to get even more detailed data on products and services that can save you money—by inserting coupons in their advertisements requiring only your name and address. Other manufacturers have made valuable catalogs available to you through the Catalog Service Pages found in every section of this issue.

Use them. Tap the valuable information thus easily made available to you.

"FUEL SAVINGS
alone have paid back the cost of our Powers control in less than 3 years"
"and it's helped improve the efficiency and health of our employees."

● Prevent OVER and UNDER-heating in your factory workrooms—offices and process rooms. Keep each room or department at the right temperature with Powers automatic temperature control.

Powers control cuts heating costs 15 to 40%—Speeds-up production by increasing efficiency and output of workers—Helps to improve the quality of products affected by temperature or humidity—Reduces time lost by workers on account of "colds" and more serious ills. Savings quickly pay back its cost.

Write for Bulletin No. 200

Powers Type D Thermostat

THE POWERS REGULATOR COMPANY
2720 Greenview Ave., Chicago, Illinois

Send a copy of Bulletin No. 200. I am interested in ☐ Temperature Control ☐ Humidity Control for ☐ Offices ☐ Factory ☐ Process Room

Name_____ Title_____

Company_____

Address_____

49-D

POWERS TEMPERATURE AND HUMIDITY CONTROL

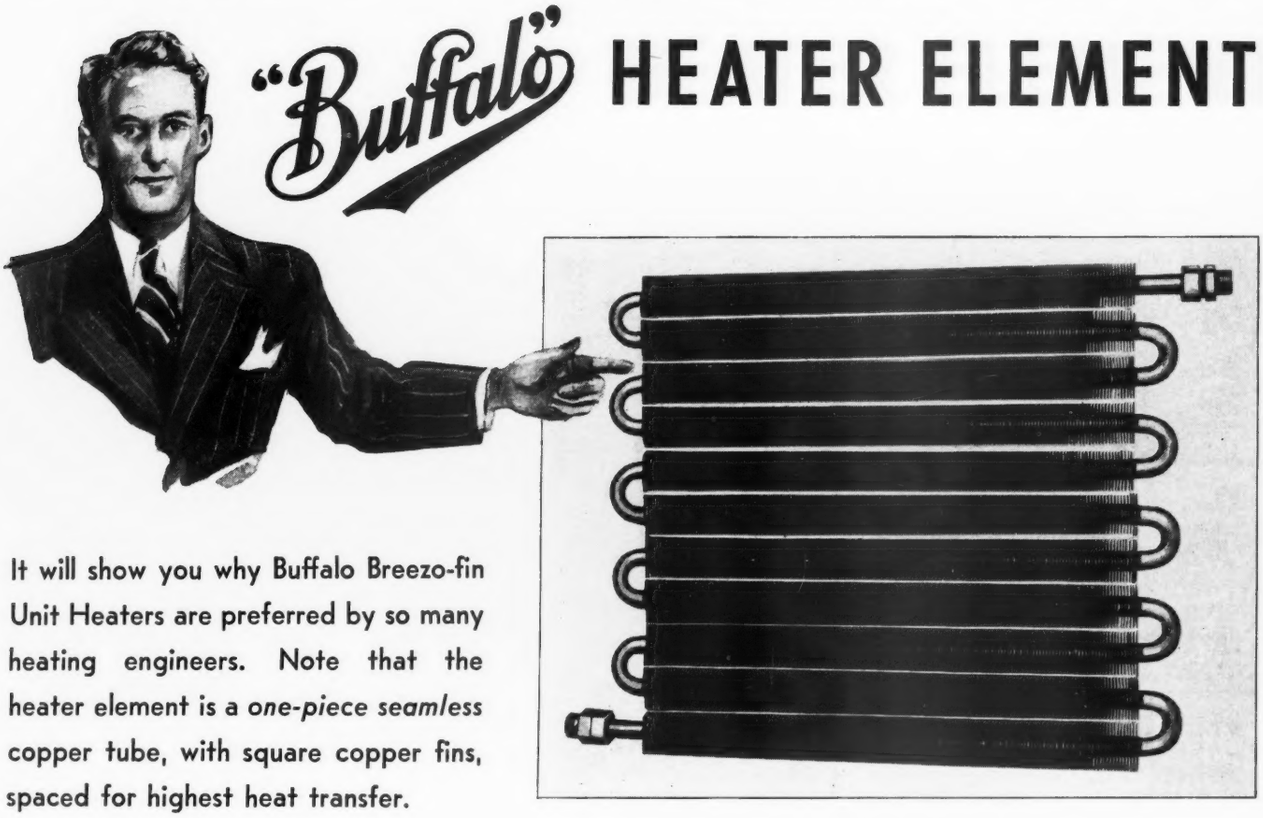
Perpetual Equipment Show

Do you realize that leading equipment and materials manufacturers conduct a perpetual equipment show for you every month in the advertising pages of FACTORY?

In these pages they bring to you their latest available information and ideas. During the course of a year, you find in FACTORY around 1500 pages of advertising from 300 leading manufacturers.

As one reader put it—"I consider the advertising pages of FACTORY a most useful source of information on the latest developments in equipment and materials."

TAKE A LOOK AT THIS "Buffalo" HEATER ELEMENT



It will show you why Buffalo Breezo-fin Unit Heaters are preferred by so many heating engineers. Note that the heater element is a *one-piece seamless* copper tube, with square copper fins, spaced for highest heat transfer.

There is only an inlet and a discharge joint on this coil (both outside the unit)—hence *there is no possibility of leakage inside the unit.*

Furthermore when you specify Buffalo Unit Heaters, you know you are getting fan performance at top efficiency and the quiet and economical operation for which Buffalo Units are famous.

Prompt Shipments from Stock

Tell us your requirements. We are prepared to take care of them immediately. For further information write for Bulletin 3137-A.

BUFFALO FORGE COMPANY

471 Broadway, Buffalo, N. Y.

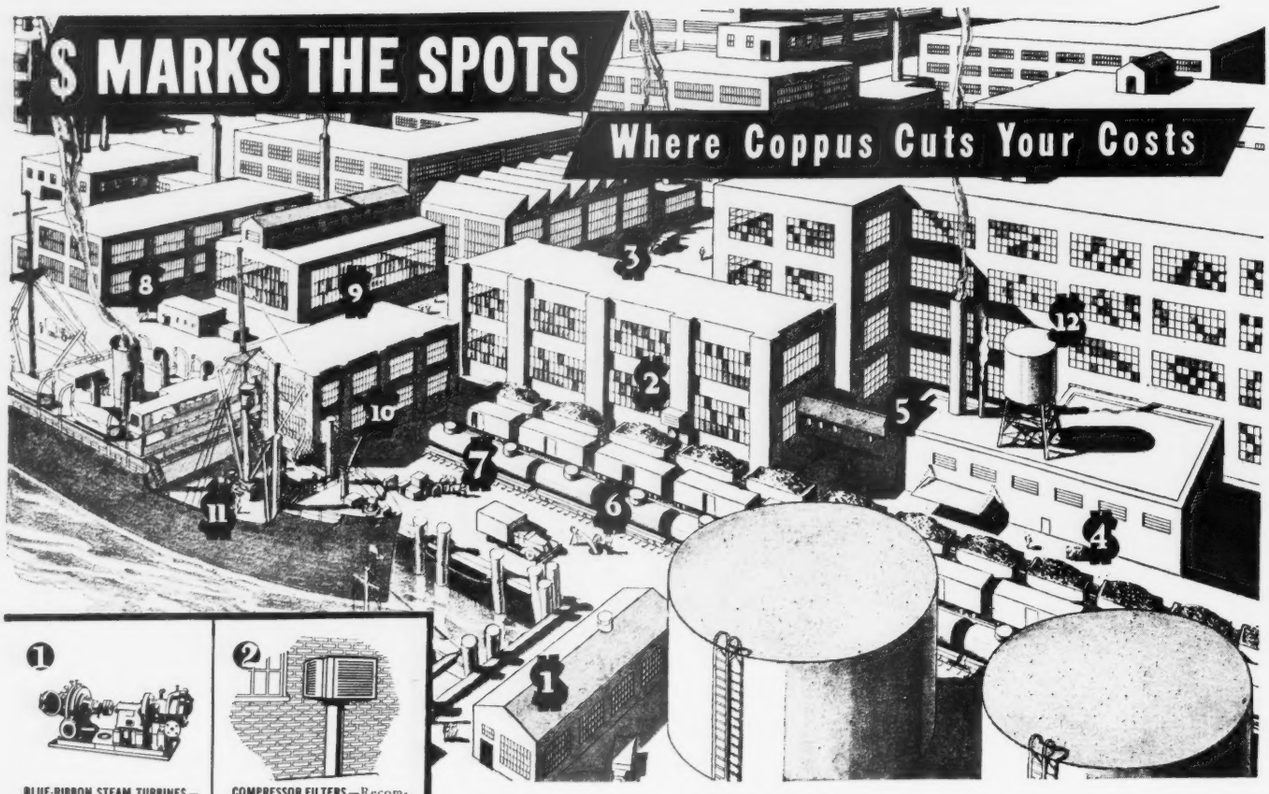
Branch Engineering Offices in Principal Cities

Canadian Blower and Forge Co., Ltd., Kitchener, Ont.

"Buffalo" Breezo-Fin HIGH EFFICIENCY UNIT HEATERS

$ MARKS THE SPOTS

Where Coppus Cuts Your Costs



1 **BLUE-RIBBON STEAM TURBINES**—6 sizes up to 150 H.P. Prices in line. Horizontal, vertical, or with built-in speed reducers.

2 **COMPRESSOR FILTERS**—Recommended by manufacturers who supply over 90% of the country's compressors and engines.

3 **STATIONARY UNIT AIR FILTER**—95.6% efficient against 2 micron-size silica dust. Highest U. S. commercial rating.

4 **VENTILATOR FILTERS**—Combination ventilator-filter unit for laboratories, instrument assembly rooms, etc.

5 **NATURAL GAS BURNERS**—Coppus-Dennis Fanmix for industrial applications. Pinwheel action produces perfect gas-air mixture.

6 **CABLE MANHOLE VENTILATORS**—Fast ventilation of *any* confined space. Electric motor or gasoline engine driven.

Like thousands of other top-class plants, you can save on fuel, on air cleaning and moving, on power . . . by using Coppus products. Designed for your industry's general needs — but Coppus engineered to meet your *individual* requirements—Coppus natural gas burners, filters, blowers and turbines give *more efficient* service. It's tailor-made economy.

Start putting your plant on the $ spot. Check off below which bulletins you'd like us to send you. There are a thousand ways to use Coppus—a thousand ways for *you* to save. The bulletins will give you ideas.

7 **TANK AND TANK CAR VENTILATORS**—Supply clean, cool air to men working. On cars — attachable to nipple if desired.

8 **BOILER MANHOLE BLOWERS & EXHAUSTERS**—swift cooling and ventilating of boilers, tanks, retorts, etc.

9 **MANCOOLING FANS**—Keep production up by keeping men cool. No stale air-recirculation. Air is *directed*.

10 **HEAT KILLERS**—High speed blasts for cooling and drying furnaces, motors, generators, *products*, etc.

11 **SHIPHOLD VENTILATORS**—For exhausting welding fumes and other injurious gases from confined working spaces.

12 **VANO BLOWERS**—Fitted to meet any special air problems where ordinary fans fail. They are *most* efficient.

CHECK ✓ NUMBER OF APPLICATIONS

1 ☐	5 ☐	9 ☐
2 ☐	6 ☐	10 ☐
3 ☐	7 ☐	11 ☐
4 ☐	8 ☐	12 ☐

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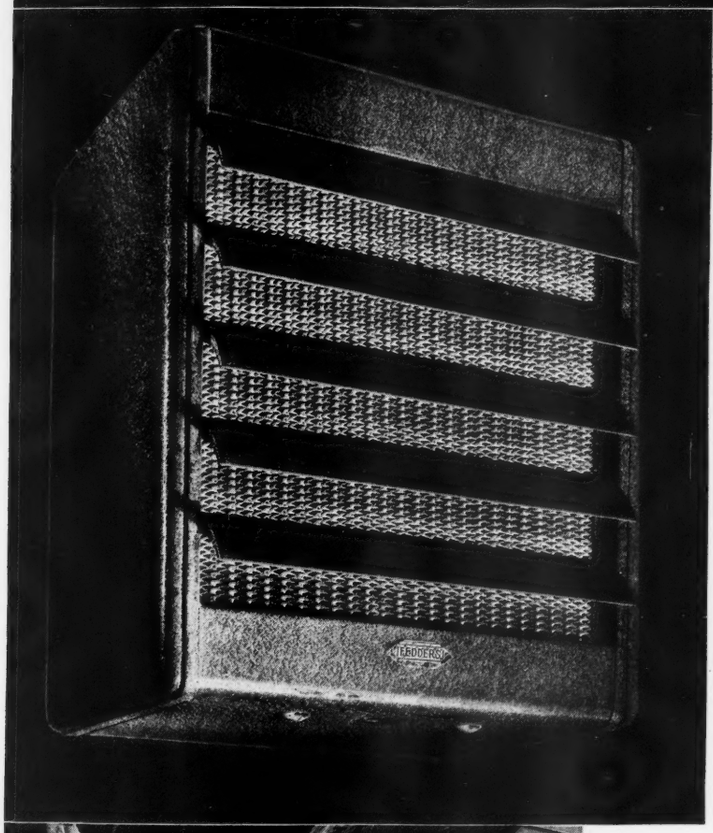
COPPUS ENGINEERING CORPORATION

375 Park Avenue, Worcester, Massachusetts

DESIGNED FOR YOUR INDUSTRY · ENGINEERED FOR YOU

FEDDERS



The Unit Heaters that RE-DESIGNED THE INDUSTRY

FEDDERS HANDSOME MONO-PIECE CABINETS that opened up the entire commercial market in addition to the usual industrial market. Smooth lines, no exposed bolts, attractive brown morocco and silver-satin finish make Fedders Unit Heaters at home in any surroundings.

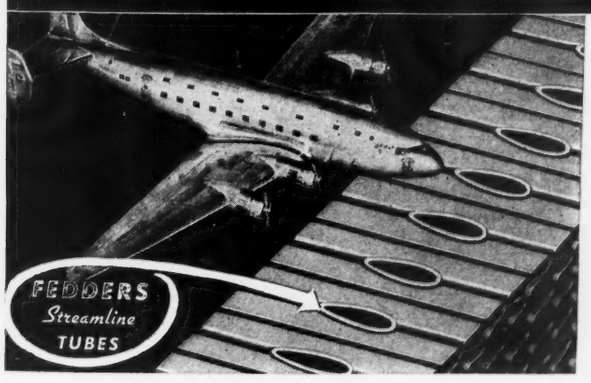
EXCLUSIVE **STREAMLINE TUBES combine air handling and heat transfer efficiency.**

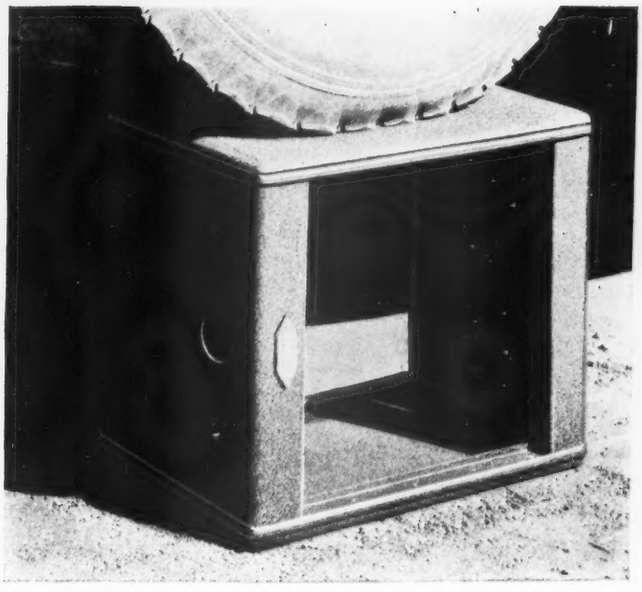
EXCLUSIVE **NON-CLOGGING FINS aid in maintaining efficiency under difficult operating conditions involving dust and lint.**

EXCLUSIVE **FULL-FLOATING MOUNTINGS protect heating element from expansion strains and piping stresses.**

EXTREME STRENGTH **is illustrated by Fedders Unit Heater cabinet supporting weight of 3900 lb., 8 cylinder automobile.**

COMPLETE LINE **of 25 well-graduated sizes from 75-1100 EDR. Write for Bulletin 573.**





FEDDERS
MANUFACTURING CO.

67 Tonawanda St. Buffalo, N. Y.

Heat Transfer Specialists Since 1896

UNIT
HEATERS
Young unit heaters of either the suspended or floor type keep the air in active circulation, maintain even temperatures, eliminate drafts, dispel damp, use little or no floor space and lower heating costs. You get better heat for less money from unit heaters than from other types of equipment.
Young unit heaters are available in many sizes and capacities. Write for latest catalog.
Sales and Engineering Offices in all Principal Cities
YOUNG RADIATOR COMPANY
Racine
Wisconsin
Young

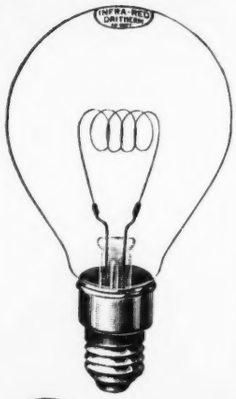
DRYING PROBLEMS MADE EASY with NALCO DRITHERM

Infra-Red Ray—Carbon Lamps

Radiant energy drying with Nalco Dritherm Lamps simplifies many drying problems with these advantages:

- Cuts drying costs
- Does not require ovens
- Eliminates "warm up" time and cost
- Uses minimum space
- Gives uniform results

The scope of application of Infra-Red Ray drying with Nalco Lamps is being widened every day. It may be the answer to *your* problems, too.



Inexpensive and Easy to Test

Because of the flexibility and simplicity of the installation it is easy to test the application of Infra-Red Ray drying to your problems. A standard test unit can be set up and complete details worked out with minimum investment. Your electric utility company will cooperate in computing costs and can furnish pertinent information.
We shall be pleased to supply comprehensive literature and data on request. Write today.

NALCO SAINT LOUIS INFRA-RED DRITHERM

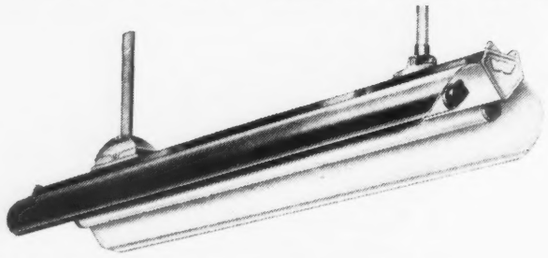
Insist on this seal on every lamp . . . it is the mark of the *proved* lamp for radiant energy drying.

NORTH AMERICAN ELECTRIC LAMP CO.
1044 Tyler Street St. Louis, Missouri.

For the GENERAL ILLUMINATION of Industrial Areas . . . The WHEELER "DAY-FLO"

Two Tube, 40 Watt Lamp

FLUORESCENT LIGHTING UNIT



Here is a new porcelain enameled "Daylight" Fluorescent unit that does an exceptionally good job of General Lighting in industrial areas.

The "DAY-FLO" provides color-corrected light, is highly efficient, cooler in operation, ideal for color matching, easily installed, and easily serviced.

Unit is available for 110–125 volt, or 220–250 volt operation, and is furnished complete with sockets and auxiliaries for each lamp. Can be supplied *wired* or *unwired.*

For complete data write for New Bulletin No. 62

Distributed Exclusively Through Electrical Wholesalers

WHEELER REFLECTOR COMPANY
275 Congress St., Boston, Mass.

for Results

USE

Mc GRAW-HILL
DIRECT MAIL LIST SERVICE

Power, Heat, Light, and Air Conditioning

FACTORY, through the cooperation of leading manufacturers, makes it possible for you to secure catalogs, bulletins, and booklets listed here without cost or obligation. Check and fill out the coupon below and send it to FACTORY. See other sections for additional catalog listings.

1 **Air Conditioning**—New 1939 bulletin outlines most modern principles of design, methods and equipment items for industrial systems. Installation for different types of manufacturing plants are described with illustration. Also includes reference to initial and operating costs. An up-to-date 20-page treatise. **J. O. Ross Engineering Corp.**

2 **Air-Handling Equipment**—Bulletin F-310-4 describes Coppus "Blue Ribbon" Air Filters for compressors and engines. Bulletin F-320-4 is devoted to Unit Type Air Filters. Manhole and Tank Ventilators are discussed in Bulletin 163-1, Manhole Blowers and Exhausters in Bulletin 161-3, Turbo Blowers for Undergrate Draft in Bulletin 145, Mine Ventilation Blowers in Bulletin 121-2 (compressed air driven) and 122-2 (electric motor driven), and Fanmix Gas Burners in Bulletin 410-1. **Coppus Engineering Corp.**

3 **Diesel Operations**—Comprehensive 84-page book on the relation of fuel and lubricants to operating efficiency in the diesel engine. Contains complete data on engineering tests as well as information on how to correct conditions that cause reduced operating efficiency. Well illustrated and clearly written. **The Texas Co.**

4 **Electro-Matic Air Filter**—Bulletin #250 explains how electric precipitation has been combined as an integral part of an automatic air filter to obtain higher efficiency in the removal of atmospheric dust and smoke, with the constant uniform performance of a self-cleaning air filter. **American Air Filter Co., Inc.**

5 **Evaporators**—Complete A.I.A. catalog No. 5039 describes a new line of direct expansion coils for use in air conditioning. It contains comprehensive and useful data on evaporators with many tables and formulas to assist the reader in the proper selection of equipment. **Young Radiator Co.**

6 **Flood Light Heating**—Principles of economical and uniform heating of industrial plants are explained in a comprehensive and interesting bulletin. Methods are given for applying flood light heating to various types of rooms and buildings. Very valuable is a discussion of the revolving type of air discharge outlet—the latest development for producing unusually even heat distribution. **L. J. Wing Mfg. Co.**

7 **Fluorescent Lamp**—8-page bulletin, No. 522, introduces new 100-watt Cooper Hewitt fluorescent lamp for general industrial lighting. Discusses features of the lamp, high output, high efficiency, long life and cool light source. Bulletin contains complete specifications of this new lamp, as well as a foot candle table and photometric rating chart. **General Electric Vapor Lamp Company.**

(Continued on page 96)

Zero Cold
or
1000° Heat
the air can be supplied with
ROSS
Air Systems
Hundreds of exacting processing operations are not only being successfully completed with ROSS pure air systems, —but with far greater uniformity of production. They are designed for maintaining any temperature—from zero to 1000°F. If it's a job for AIR—it's a job for ROSS Air Systems. What's your problem?
BAKING
DRYING
CHILLING
REFRIGERATION
AIR CONDITIONING
DEHUMIDIFICATION
J. O.
ROSS ENGINEERING
CORPORATION
350 MADISON AVE., NEW YORK, N. Y.
CHICAGO, ILL. DETROIT, MICH. PITTSBURGH, PA. PORTLAND, ORE.
ROSS ENGINEERING OF CANADA, LTD., Dominion Square Building, Montreal

Use the coupon to Secure Valuable Manufacturers' Literature

Section 2 MAILING COUPON—NOVEMBER 1939—Good Until February 28, 1940

FACTORY MANAGEMENT & MAINTENANCE
330 West 42nd Street
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Please have the manufacturers send me, without obligation, the literature circled below. (Numbers correspond to descriptive paragraph numbers.)

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Name..... Title.....

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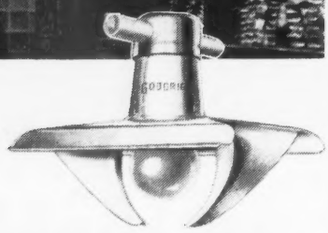
Please fill out this coupon completely in order to avoid delay in handling.



THIS FIXTURE
Gives You Better
STOCK ROOM LIGHTING

What a difference it makes when stock clerks can read comfortably anywhere in the aisles! It means better working conditions; faster, more accurate filling of orders with proper illumination from top to bottom shelves and into bin interiors. Yet there's no glare in the aisles to cause eye fatigue. Through the scientific use of reflection, this fixture directs light where it is most needed, uses the lamp's full intensity, gives you the illumination you're paying for.

THE STOCKLITE
—An Exclusive Goodrich Product

Designed especially for this purpose—a porcelain enameled reflector—built for lifetime service. It costs but little to correct poor illumination with this new fixture. You'll find all the facts in Bulletin No. 91, "Light on the Subject of Stock Bin Illumination." May we send it to you?

Sold Only Through Electrical Wholesalers

MEMBER OF R. L. M. STANDARDS INSTITUTE

GOODRICH
ELECTRIC COMPANY
OFFICES IN ALL PRINCIPAL CITIES

GENERAL OFFICES AND FACTORY: 2904 N. OAKLEY AVENUE, CHICAGO, ILL.

FACTORY'S Catalog Service
Section 2 (continued)

8 **Fluorescent Lighting Bulletins**—Contain valuable data on the use of the new fluorescent lighting for both localized and general illumination. Shows how to obtain best results; complete details of Benjamin Dayliter, Flur-o-liter and Stream-liter Fluorescent units. **Benjamin Electric Mfg. Co.**

9 **Fluorecent Lighting Unit** — Illustrated leaflet furnishes information as to features, installation, and maintenance of HF-100 fluorescent lighting unit, the unit package of light. Length, width, height, voltages, net price is given. **Hygrade Sylvania Corporation.**

10 **Fluorescent Lighting Units**—Folder "Quick Ways to Speed Work . . . Cut Costs . . . Reduce Rejections" describes the use of fluorescent lighting units for general and supplementary illumination of working areas, inspection benches, drafting rooms, and offices. Also shows interesting industrial applications of Plugmold "plug in anywhere" multioutlet system and "pancake" Wiremold products. **Wiremold Co.**

11 **Induced Draft Fans**—Bulletin 3143. A new 24-page bulletin illustrating construction details of Buffalo induced draft fans now available. Has many illustrations and covers the subject from design to installation with engineering data of interest to engineers. **Buffalo Forge Co.**

12 **Industrial Insulations**—32-page brochure, Form IN-51A, gives recommended thicknesses for insulating materials serving a temperature range from 400 deg. F., below zero, to 3,000 deg. F. above, as well as drying and insulation recommendations for power plants and eight special industries. **Johns-Manville.**

13 **Lighting Fixtures for Fluorescent Lamps** — New bulletin describes Fluorescent lamps, auxiliaries and complete line of industrial lighting fixtures for use with the Fluorescent Day-light Lamp. Fixtures are unparalleled for inspection, fine assembly, color-matching work, etc. Bulletin also contains Typical Comparative Footcandle Data and information about special applications. **Wheeler Reflector Co.**

14 **Lighting Manual** — Invaluable to everyone who specifies or purchases industrial lighting reflectors. Tells purposes of and details standards which assure maximum lighting performance. **RLM Standards Institute.**

15 **Plant and Process Heating**—Two bulletins describing the "Supertherm" heating system which utilizes water at steam saturation temperature for use in plant process heating as well as for general heating of plants and warehouses. Illustrates actual installations and gives engineering information on advantages of this type of installation. **J. O. Ross Engineering Corp.**

16 **"Poweram" Stokers**—Well illustrated 20-page catalog tells how heavy duty worm feed, ram distribution stokers help produce more steam for

heating, power or process per dollar invested in fuel and labor. Also includes an engineering analysis of "Six Essentials of Successful Stokers," to permit mechanical firing and lower cost fuels. Includes case experiences of typical users. **Iron Fireman Mfg. Co.**

17 **Recording and Controlling Flow Meters**—40 page catalog. No. 1051, contains engineering data on theory and practice of modern day measurement of fluids by means of electric and mechanical flow meters. Liberally illustrated with line drawings to show principle of operation and method of installation. Contains information on preventing wastes in use of steam, water, air, gas, oil, etc. **The Bristol Company.**

18 **Smoke Control**—A bulletin describing simplified and rugged electric eye smoke indicator for mounting in flue or breaching. Shows photographs of installations and includes diagrammatic installation sketch. **Photoswitch Inc.**

19 **Steam Turbines**—Bulletin 135–8 discusses facts to be considered in purchasing steam turbines and presents various mechanical features of Coppus "Blue Ribbon" Turbines. Several pages are devoted to performance curves and sectional views. Built-in speed reducers, constant speed governors, excess speed safety trips and vertical turbines are described. **Coppus Engineering Corp.**

20 **Stock Bin Illumination**—Well illustrated booklet No. 91 describing a line of specially designed reflector equipment for stock room lighting. Designed to deliver maximum usable light and eliminate wasted light where it is not needed. **Goodrich Electric Co.**

21 **Unit Heaters**—For floor installation or ceiling suspension. 16-page bulletin gives data and capacities on all sizes designed with centrifugal fans for large area heating. Can be furnished with Synchrotherm Control. Describes how this control provides uniform temperatures with definite savings in fuel costs. **Clarage Fan Co.**

22 **Unit Heaters**—Bulletin 573 describes complete line of Series 4 unit heaters built in graduated sizes from 75 to 1100 EDR capacities for heating and ventilating industrial plants. Also describes use for process drying and fog dispelling. Contains complete specifications and engineering data. **Fedders Mfg. Co.**

23 **Unit Heaters**—28-page illustrated bulletin describes a new model unit heater with many distinctive features, including built-in safety fan guard, rust protection by Bonderizing, and sound silencing by acoustical insulation. Contains data on heating performance, range of sizes, dimensional diagrams and capacity tables. **Modine Mfg. Co.**

24 **Unit Heaters**—Catalog 396 contains complete information necessary for selecting and installing heaters including capacity tables, installation, wiring and piping diagrams. Also provides information on how to determine the number and size of heaters required for given installations. Well illustrated with application photographs. **B. F. Sturtevant Co.**

(Check numbers on coupon page 95)

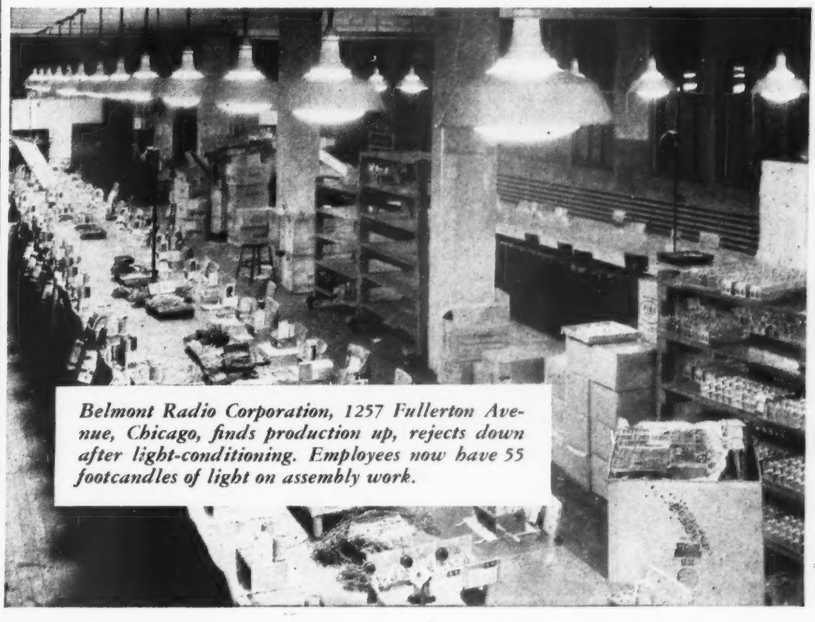
"TRY G-E LIGHT-CONDITIONING!"

says Belmont Radio Corporation . . .
and proves it with increased production

MORE LIGHT FOR YOUR MONEY
because
THEY STAY BRIGHTER LONGER

DOES better light actually increase production?
The Belmont Radio people were skeptical . . . until they had a trial fixture demonstration. Now, with 55 footcandles of light on assembly work, they report a definite decrease in rejects per unit production.
How is the lighting in *your* plant? Have employees enough light so that no unnecessary time is lost . . . so that no mistakes are made that could be avoided through better seeing conditions?
Your local electric company will measure your lighting free of charge. But whatever your problem, you'll get more light for your money if you use G-E MAZDA lamps. They're more efficient than ever this year—and they stay brighter longer!

G-E MAZDA LAMPS
GENERAL ELECTRIC



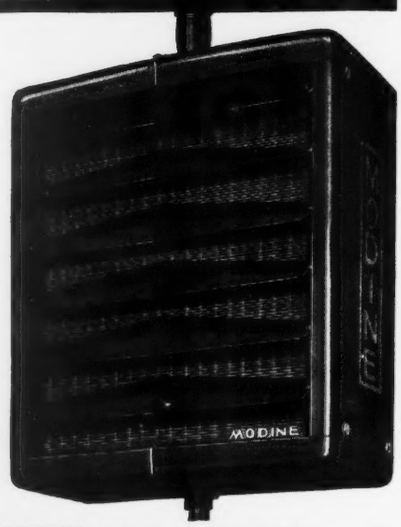
Belmont Radio Corporation, 1257 Fullerton Avenue, Chicago, finds production up, rejects down after light-conditioning. Employees now have 55 footcandles of light on assembly work.

Look at all these NEW Features

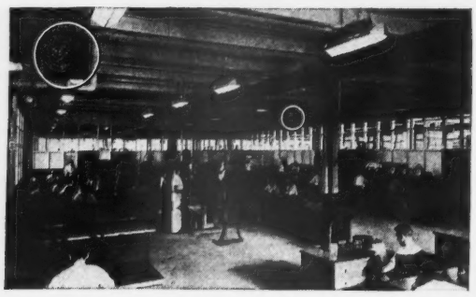
. . . . only the New MODINE Unit Heater has them

New vital-value features! Exclusive differences in design! Modine-pioneered, time-proven heating developments! What unit heater has them all? *None but the new Modine!* It's America's standard unit heater value.

Modernize with Modines *now!* Get the production protection and employee comfort that Modine's faster, more effective, *automatic* heating can give you. Cut fuel and maintenance costs. Enjoy winter-long peace of mind. *Now*—when your heating dollar buys more than it is likely to buy for a long while again! *Get New Modine Catalog 139.*



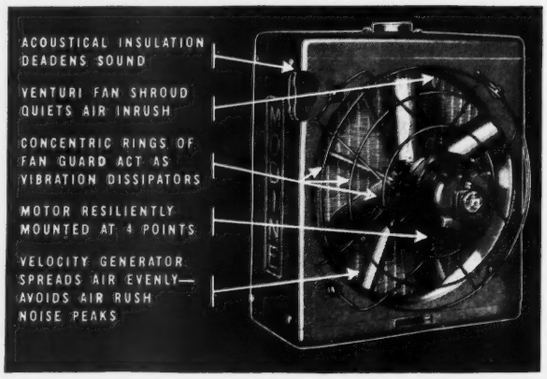
NEW SAFETY FAN GUARD
AN INTEGRAL PART OF DESIGN, actually incorporated into the basic structure of the Modine unit, securely attached at four points. Instead of the menace of a unit heater fan left unshielded, Modine's staunch steel safeguard gives constant protection. Safety is built in as standard equipment.



NEW RUST PROTECTION . . . BY BONDERIZING—Modine is the *first* and *only* unit heater on which *protection against rust by Bonderizing* is available. Bonderizing, when applied, not only makes Modine casing and other sheet metal parts resistant to the formation and progress of rust. *It holds the finish to the metal,* making it infinitely more durable and permanently fine in appearance.

NEW BEAUTY OF APPEARANCE
Clean, flowing lines give the new Modine a virile modern beauty in keeping with latest industrial plant interiors.

NEW SOUND SILENCING—


ACOUSTICAL INSULATION DEADENS SOUND
VENTURI FAN SHROUD QUIETS AIR INRUSH
CONCENTRIC RINGS OF FAN GUARD ACT AS VIBRATION DISSIPATORS
MOTOR RESILIENTLY MOUNTED AT 4 POINTS
VELOCITY GENERATOR SPREADS AIR EVENLY—AVOIDS AIR RUSH NOISE PEAKS
MODINE

AND ALL THESE ADDITIONAL FAMOUS MODINE FEATURES

VELOCITY GENERATORS give greater heat throw without increasing power demand. • ALL-COPPER CONDENSER. All steam or condensate carrying passages are pure copper or copper alloy. • PATENTED EXPANSION BEND permits condenser tubes to stand extreme expansion under high temperatures and pressures without leakage. • METALLIC BONDING preserves original heat transfer capacity between tubes and fins. • PATENTED DIRECT-PIPE SUSPENSION permits installation without hangers; saves cost.

GET NEW CATALOG 139

MODINE MANUFACTURING COMPANY, 1730 Racine St., RACINE, WISCONSIN
INDUSTRIAL, COMMERCIAL, RESIDENTIAL • HEATING, COOLING, AIR CONDITIONING

Mechanical Power Transmission

in the cost-reducing program

INDUSTRY HAS SPENT MILLIONS for mechanical transmission equipment. For hundreds of thousands of belts. For speed reducers, lineshafts, variable-speed devices. For all the mechanisms that transmit power from drive unit to machine.

Much of this equipment is old. Some is obsolete. Some is worn out, inefficient, or misapplied. Too much is wasting power—and that means wasting dollars.

This old equipment taxes already heavily burdened plants with high maintenance expense; with breakdown production losses.

Those costs don't show as such on the books. They are concealed among other costs. Few know of their existence. Fewer still pay very much attention to them. But they *do* exist—and they drain profits.

Industry need not pay those heavy tolls. It can do something about them. Industry can study its power transmission problems with the same care it gives other details of plant operation. It can find out exactly what kind or type of mechanical power transmission equipment is needed for each application. Then it can see that this equipment is properly installed, operated, and maintained.

WHAT TO DO

SUGGESTIONS THAT POINT THE WAY

Check the condition of all power drive equipment.

With group drives, consider the advisability of making groups larger or smaller, or replacing by individual drives.

With individual drives, consider the advisability of changing to group drives.

Study the suitability of each type of transmission medium used.

With belt drives, check type and rating to determine suitability for the application.

Consider whether use of a variable-speed transmission on different machines would increase output or quality of product. If now used, would another type be better suited to the needs?

Check alignment of all lineshafts, couplings, and clutches.

Consider advisability of using anti-friction bearings to reduce friction and maintenance costs.

Study possibility and advantages of reducing noise and vibration by the use of isolating materials or devices designed for that purpose.

Consider possibility of replacing present lubricants and lubricating devices with more suitable types.

QUICK WAYS TO PROFITS

MORSE Roller CHAIN

INTERCHANGEABLE

The Morse 3700 Series Roller Chain is interchangeable with every other standard round pin roller chain. A new and effective design makes possible complete interchangeability without sacrificing the lubricating features which make Morse Roller Chains so outstanding in the power drive field.

Morse Roller Chain on new equipment or for replacement will bring to roller chain power drives longer life, quieter operation, greater ruggedness, plus the flexibility of a conventional type chain. . . And remember, Morse Roller Chains cost no more than ordinary type drives!

ALL PARTS INTERCHANGEABLE WITH ALL STANDARD ROLLER CHAINS
THE PIN LINK
THE BUSHING LINK
OFFSET LINK
for chains with uneven

RETAINS ITS LUBRICATING FEATURES

The patented design of the Morse round-pin chain builds an oil feed system in every link!

Oil placed on the rollers flows to the bushing surface, where spaced channels extend the full width of the bushing face, through bushing side plates. Oil follows along channels to the pin sideplates and to the pin, spreads over the entire pin and bushing contact surfaces.

The Morse man in your territory or Morse, Ithaca, will tell you all about the Morse round-pin, channel lubricated Roller Chain.

Instead of oiling the chain between side plates to reach wearing surfaces (as in conventional roller chains)—

Morse provides a path for oil from *rollers*, out through side plates to pin surfaces—where wear takes place.

SILENT CHAINS ROLLER CHAINS FLEXIBLE COUPLINGS KELPO CLUTCHES

MORSE *positive* DRIVES

MORSE CHAIN COMPANY ITHACA N. Y. DIVISION BORG-WARNER CORP.

Variable-speed drives in this plant are credited with increasing the earning power of each machine about $10 a day

New Drive Ups Output

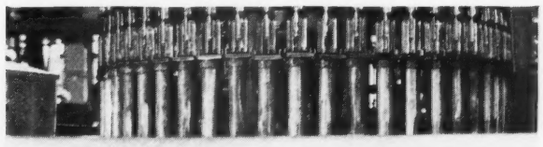
In a plant that manufactures spring-tension fasteners of special design, application of variable-speed drives to the punchpresses has resulted in a marked increase in production. For example, one small high-speed press that punches, forms, and cuts off the fasteners in one operation now turns out 18,000 pieces per hour as against 14,000 formerly obtained—an increase of more than 28 per cent.

As the result of replacing change gears on another press with a variable-speed drive, operating speeds went up from 9,000 to 14,000 strokes per hour, without any impairment of the quality of the product. The increase in this case amounted to 55 per cent.

To cite a third case of savings made, an increase of from 7,000 to 10,000 units an hour was obtained on 4-slide machines when variable-speed drives were installed. It is estimated that the extra 24,000 pieces produced in an 8-hour day increased the earning power of each machine about $10 a day. At this rate it did not take long for each of these variable-speed drive installations to pay for itself.

NOT A BEARING FAILURE IN 8 YEARS

Eight years ago, a large New England brewer had several costly bearing failures on refrigerating equipment, pasteurizers, filters, and labelers. Lost time and slowed-down production were piling up costly losses. Consulting engineers diagnosed the cause as improper lubricants and ineffective lubrication. Lubricants were changed. A modern and efficient system was installed. Net result: Not a breakdown since the change-over



No Shutdowns for Repairs

Duty of transmitting between 600 and 800 horsepower while traveling at a speed in excess of 6,000 feet per minute proved to be too much for the type of belt originally installed on a large compressor. Slippage was excessive, resulting in failure to carry the full load and frequent shutdowns for repairs.

Replacement of this belt with a leather belt brought complete relief from these troubles. It has been in operation for several years and during that period an occasional application of belt dressing is all the maintenance attention that has been needed.

Life Between Overhauls Increased 400%

Service life increased by 400 per cent is the story of a 150-hp. centrifugal pump after replacement of plain bearings by ball-bearing pillow blocks.

This pump was moving 900 tons of sand daily over a distance of ¾ mile,

✦

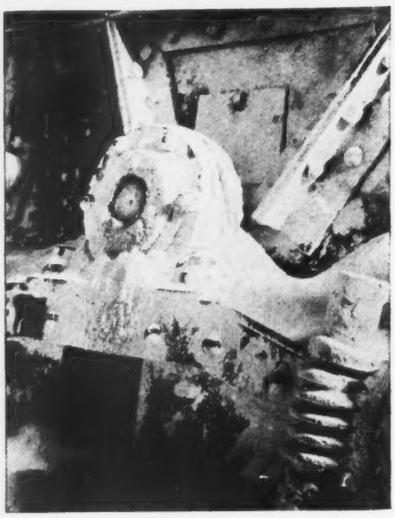
A shoe company in Massachusetts shifted from an ordinary lubricant to one specially fitted for the job. On edge trimmers running at 3,600 r.p.m., buffers at 4,280, and heel scourers at 3,500, only 25 pounds of the new lubricant is used to 100 pounds of the old.

with a rise of 100 feet. The sand worked its way into the babbitted bearings, which wore and allowed the impeller to rub against the casing. A thorough overhaul was necessary every sixteen days.

After installation of the ball bearings the pumps ran an average of 80 days between overhauls—not of the bearings, but of housing and runner. This type of repair called for 7 man-hours as against 2 man-days for the earlier type of overhaul.

Additional advantages, resulting in cost saving, were the elimination of several spare pumps and greatly reduced consumption of lubricant.

NO DOWN-TIME IN YEARS



This pillow block has been in continuous service for 18 years. Although covered with limestone dust, it has required no attention beyond occasional lubrication. Construction of the labyrinth and covers is such that no foreign material of any kind can get in, and the lubricant cannot work its way out. Failure of this pillow block would mean idle men and machines, lost production, labor and material costs for replacing it. For 18 years the plant in which this pillow block is installed has been spared all such profit-reducing costs

If Motor Fails, Clutch Permits Hand Operation

In most plants an occasional interruption of the electric power supply for a short period does not usually have more serious consequences than the loss of production that inevitably results. There are, however, some applications where even momentary interruption of power cannot be tolerated. In such instances some appropriate means must be provided for keeping the wheels turning under all circumstances.

A large plant that conducts many processes involving chemical reactions has found it is absolutely essential that certain machines be kept turning over until completion of the processes carried on in them. Since the amount of power required to drive these machines is not excessive, a free-wheeling clutch is installed between motor and machine. In the event of power failure the free-wheeling clutch makes it possible to turn the machines by hand, thereby safeguarding the process.

Ball Bearings Save $1,850

Modernizing transmission equipment was the method adopted by the superintendent of a woodworking plant to cut high poduction costs. This move is netting savings of $1,852.41 per year.

More than 300 ball-bearing hangers support lineshafts that drive trim saws, jointers, planers, stickers, band saws, and all kinds of woodworking machinery. Lineshafts $2\frac{7}{16}$ and $1\frac{15}{16}$ inches in diameter are used. They run at speeds between 290 and 315 r.p.m. The longest single lineshaft is 130 feet.

Three countershafts which drive drum sanders are mounted on ball bearings. These shafts are $2\frac{3}{16}$ inches in diameter and operate at 860 r.p.m. Ball bearings are also used on some of the machines.

Friction has been greatly reduced by the use of ball bearings. When the belts have been removed fom the 130-ft. lineshaft, which is $2\frac{7}{16}$ inches in diameter, it can be turned with the thumb and finger of one hand.

The power saving effected by the use of ball bearings is important. With the old bearing hangers an average of 17 per cent more power was required. Since a total of approximately 404 horsepower is required to drive the lineshafts running in ball-bearing hangers, the saving in power, at 1 cent per kilowatt-hour, amounts to $1,553.41 annually.

Four times a year the hangers are inspected to see that they are properly lubricated and in good condition. This requires 15 hours work each time, or 60 hours per year.

"When we were using babbitt-bearing hangers," says the superintendent, "we had to go over our equipment and oil the bearings two times a week. This was a five-hour job each time, or ten hours a week. In a year, 520 hours of the oiler's time was required, as against 60 hours under present conditions. The maintenance labor is thus reduced about 88 per cent. At 65 cents per hour, the labor saving amounts to $299 per year.

"The saving in power and in oiling labor totals $1,852.41 annually. Also, since the sleeve bearings had to be oiled twice a week, the cost of the oil was considerably more than the present cost of the grease used in the ball bearings."

Chain Drive Doubles Output of Paint Mixers

Output of a battery of paint mixers in the plant of a Mid-Western manufacturer was increased approximately 100 per cent following a radical change in the method of driving. The changes involved replacing the original drive with a chain drive consisting of one silent and one roller chain. The 30-hp. silent chain drives a jackshaft at a speed of 403 r.p.m. From it the mixer shaft is driven at 99.7 r.p.m. by a double roller chain.

The increase in production is attributed to ability to operate mixers at a higher, more uniform speed than was formerly possible.

Saves 8,000 Man-Hours

By paying $225 more for a set of adjustable and detachable V-belts, one manufacturer saved approximately 8,000 man-hours, and on top of that realized a repair crew saving of $90.

In this plant, which normally operates with a force of 200 men, production is dependent on a single SO_2 compressor, equipped with an 8-ft. sheave and driven over 11-ft. center distance by a 250-hp. motor and 20 "D" size V-belts, each 38 feet long. A belt failure meant practically complete stoppage of production, while a repair crew of four men dis-assembled three bearings, removed the heavy flywheel, installed the conventional endless V-belts, and then re-assembled the equipment. Such an operation heretofore required 48 hours' repair crew time.

By installing a set of adjustable and

detachable V-belts, the manufacturer eliminated the need for dis-assembling the machine in any way, with the result that only 8 hours were required for the completion of the new belt installation and the starting of the compressor. The new belt is made of interchangeable links in a laminated form. By using this type of belt 40 hours of valuable production time was salvaged.

Leather Belt Pays Out in 3 Weeks

A 60 per cent increase in production followed in a certain plant where the type of belt formerly used between a motor and lineshaft was replaced with a leather belt.

With the old arrangement the center distance between motor and line shaft was about 10 feet. This center distance was reduced to 30 inches when the leather belt was installed, resulting in a saving of considerable space.

An increase of 60 per cent in the output of equipment driven from the lineshaft is attributed to the great reduction in belt slippage as compared with the old installation. It is estimated that this increase in production paid for the new belt in 3 weeks.

Eliminate Trouble with Forging Hammers

Finding belts that would drive forging hammers satisfactorily was a problem that took a New York State manufacturer some time to solve to his entire satisfaction.

This company operates eight groups of forging hammers, four to the group, from lineshafts driven by 60- and 100-hp. motors. When a hammer is working the belt that connects it to the lineshaft must intermittently raise a weight of 2,000 pounds. Several types of belts were tried out on the hammers, but none was found capable of driving them without excessive slippage on the steel pulleys, until a manufacturer of rubber belts secured a test of his product.

The superintendent of the plant reports that use of these belts has greatly reduced maintenance costs and practically eliminated the former loss of production time caused by belt trouble. Ability of the belts to operate satisfactorily with considerable slack has been a factor in increasing the life of both belts and fasteners. Furthermore, a gratifying power saving can now be attributed to virtually complete absence of stretching and slippage.

BETTER WORK, LESS NOISE, WITH V-BELTS

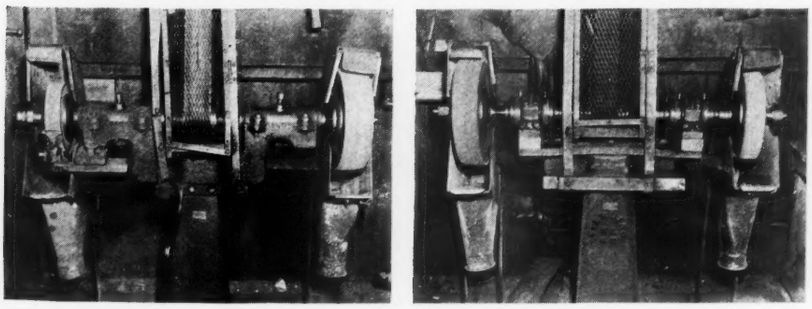
Replacement of a gear drive on a shear knife grinder with a V-belt of special design brought about several desirable results. Aside from the fact that it cost $45 less than a new set of gears, this V-belt drive eliminated the need of lubricating gears and cut down noises and vibration to the vanishing point. More accurate grinding and a quieter shop followed very much as a matter of course

✦

More than 90 per cent of all oak-tanned leather belts are destroyed by some form of rot, rather than wear. Air rot, the most destructive of all, is caused by increase in acidity of the leather. Both air rot and dry rot can be prevented by application of properly designed belt dressings.

✦

ONE MONTH'S OIL BILL PAYS FOR BALL BEARINGS



Bearings had to be oiled every 30 minutes, and rebabbitted every month. That was the log of a high-speed, two-wheel grinding head. Double ball-bearing pillow blocks were then substituted for the plain bearings at a cost of $50. Saving in cost of lubrication alone in one month was $51. Time required for lubricating almost eliminated. Production has gone up, maintenance cost down

Added Output Returns New Belt Cost

An increase in production amounting to several thousand inches of cloth per day followed the installation of a different make of leather belt on the spinning frames in a textile mill. With its high coefficient of friction, slippage of the new belt is so much less that

the speed of the frames was increased 5 r.p.m. Since each frame has 282 spindles, even a few extra revolutions mean something in the way of higher output.

It is estimated that this increase in production will pay for the new leather belt within a comparatively short time.

Lubricant Savings Bought Hanger Boxes

Applied to loom drive shafts, 324 ball-bearing hanger boxes required no added lubricant in 18 months.

In the same mill, a test on this type of bearing in comparison with plain bearings showed an annual saving of $855 in power. In the test, two sets of shafting, identical except for the bearings, were used. Each set consisted of eight single and four double lines.

✦

With a large rush job going through the plant, a manufacturer of metal stampings was suddenly confronted with a drive belt failure on a 350-ton press. Previous breakdowns had required an average time of 8 hours for belt replacements. By using adjustable and detachable V-belts, however, a repair crew of two men installed a new drive and had the press in operation in 1¼ hours.

✦

Less Noise, No Trouble with Pivoted Motor Base

The drive originally installed for a large ammonia compressor was noisy and gave so much trouble that replacement became necessary.

After study of the conditions and requirements, it was decided to put the 75-hp., 1,150-r.p.m. motor on a pivoted base and drive the compressor at 265 r.p.m. through a double leather belt 16 inches wide. Center distance is 56 inches.

Noise was greatly reduced, and there has been no trouble of any kind with the new drive since it was installed.

Lubrication Cost Off 50%

At Chrysler Corporation there is a bucket conveyor 576 feet long, part of whose travel is outdoors. It is therefore exposed to all kinds of weather. Previously the rollers on this conveyor were lubricated daily. It took 3 gallons of medium-priced oil to do the job. There was always a lot of oil drip on the walkways or machines under the conveyor. Also, much of the lubricant was washed off whenever there was a heavy rain.

A special lubricant was then picked for the job. It costs more per gallon, but there has been a 50 per cent reduction in lubrication cost. Fewer applications have meant a saving in labor. And there's no drip.

V-Belts Make Room for Two More Lathes

In one large shop six heavy roughing lathes were formerly driven by motors that were mounted on a cast-iron base at the side of the bed and drove through a train of gears.

Adoption of V-belt drive made it possible to mount the motor above the spindle of the lathe. With this arrangement the saving in space was so great that it was found possible to install two more lathes, making a total of eight, in the space previously needed for six. In addition, the V-belt drives have made this shop a much quieter place to work in.

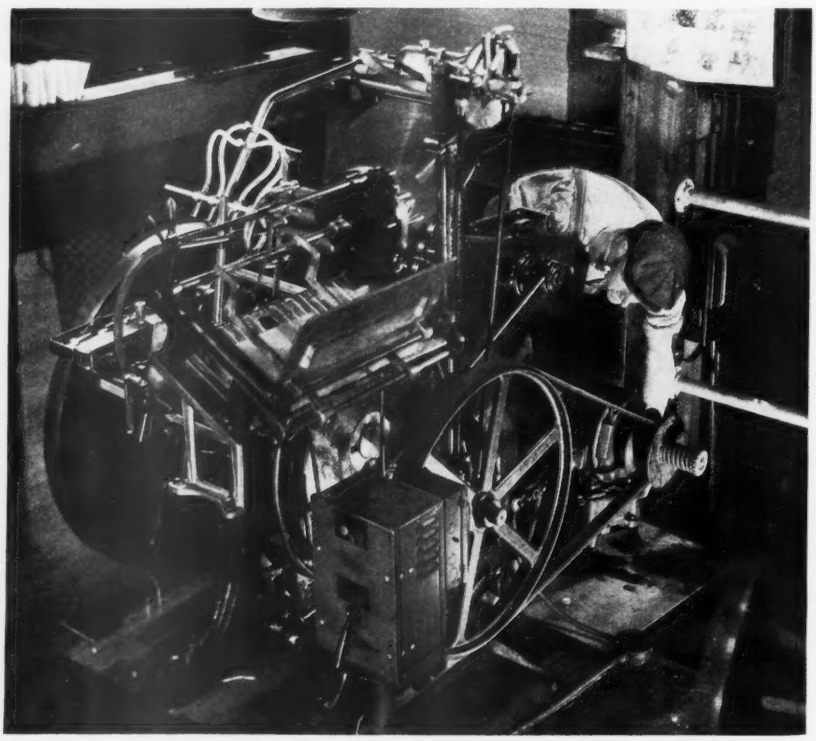
Credit Ball Bearings $107

Seven maintenance men were required to keep a battery of sewing machines in condition. They did their work on overtime, so as not to interfere with production. The seven were reduced to five as a result of the substitution of ball bearings on the machines.

When the plain bearings were in use, they became worn and caused lineshaft vibration. Bearings and shafting had to be reconditioned frequently. Frequency of lubrication was high, and excess oil dripped on the cloth.

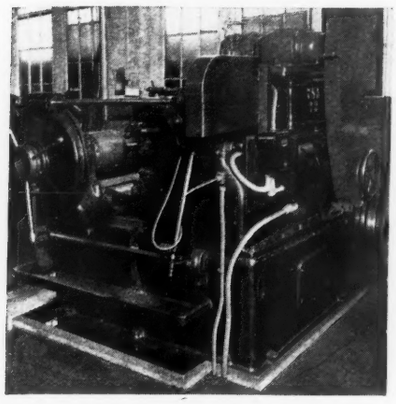
With the use of ball bearings, sealed-in grease solved the lubricating problem and stopped dripping. Comparison

12% MORE OUTPUT FROM PRINTING PRESS



Voltage of the power supply for a large printing plant fluctuates considerably at certain times of the day. Formerly the resultant drop in the speed of the presses, which were provided with rheostat control, was reflected in a corresponding drop in production. In an effort to maintain the desired speed despite the drop in voltage, the driving motor for one of the presses was equipped with a variable-speed pulley. Comparison of the output of this press with that of one with the regular rheostat control showed 12 per cent greater production

Changes Speed in a Jiffy



Fewer delays, lower costs, and more efficient operation—these are the advantages that may be attributed to the motorized variable-speed drive now used on this gear-cutting machine

A gear-cutting machine in one plant has to cut teeth in blocks of such widely diverse materials as Micarta, bronze, cast iron, 0.30 to 0.60 carbon steel, and alloy steel. The size and type of gears produced by this machine are equally diverse. To obtain the change in speed necessary for efficient operation, it was formerly necessary to use four different sizes of pulleys on the driving motor. A still wider range of speeds was considered desirable, and the use of a fifth size of pulley was contemplated. The size of the pulley frequently had to be changed, which resulted in considerable waste of productive time, aside from the labor cost of changing the pulleys and adjusting belt tension by sliding the motor forward or backward.

These delays and costs were eliminated, and the efficiency of operation was increased by installing a motorized variable-speed transmission unit which provides output speeds of 125 to 500 r.p.m. The design of this unit is such that it could be mounted on top of the machine. At the same time the belt formerly used was replaced with a silent chain inclosed in a steel housing.

With this new drive it takes only a moment to obtain any speed that is likely to be required.

of actual costs of lubricants for a year's use of ball bearings against a year's use of plain bearings showed a saving of $107 in favor of the ball bearings.

Torque-Limiting Coupling Eliminates Shock

Installation of a torque-limiting coupling cleared up serious trouble encountered with the drive for a large ball mill.

Originally, this mill was driven at 20 r.p.m. by a roller chain which connected it to the output shaft of a herringbone speed reducer turning at 60 r.p.m. Although the chain had ample strength for the running load, inertia of the mill was so high that when the 25-hp. motor was started on full voltage the chain was subjected momentarily to such a severe stress that failure frequently occurred.

It was realized that a slipring motor could be used to bring the mill slowly up to speed without undue stresses on the drive, but in view of the higher cost of such motors it was desired to accomplish the same result at less expense.

A study of available equipment led to replacement of the flexible coupling between the motor and the speed reducer with a torque-limiting coupling. This device permits the motor to develop full speed or torque without shock to the transmission equipment or driven machine, because the load is not connected until the full torque of the motor is developed. Then the load is gradually brought up to speed.

Rubber Mounting Stops Pump Vibration

Elimination of objectionable vibration from a triplex pump was accomplished by placing six rubber mountings between the concrete foundation and the heavy I-beams on which the pump and motor rest.

This pump is driven at 42 r.p.m. by a 20-hp. motor through a silent chain and gears, and develops a pressure of 1,800 to 2,000 pounds per square inch. Weight of the motor, pump, and supporting I-beams is about 3,560 pounds.

The rubber mountings prevent vibration from being transmitted to the heavy foundation. To prevent transmission through the piping, the suction and discharge lines are isolated with flexible tubing. Wires leading into the motor are also looped to minimize vibration.

✦

In a fertilizer plant, ball-bearing hanger boxes replaced plain boxes on the lineshafts from which 40 garbage reducer units were driven. A saving of nearly $700 per year was made in the consumption of power.

✦

Mill Saves $1,180 with Ball Bearings

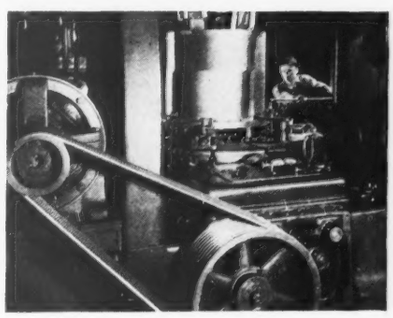
A textile manufacturer found a quick way to profits by replacing most of the old sleeve-bearing hangers in his plant with ball-bearing hangers. A summary of the economies effected in one year shows savings of $1,181.54 in power, lubrication, and maintenance costs.

A total of 96 ball-bearing hangers were installed on main lineshafts and on countershafts and jackshafts in the warp room, burling room, and several weaving rooms. Lineshafts No. 1 and No. 2 drive collar cloth looms. Each is about 95 feet long, and is supported by twelve ball-bearing hangers. One 25-hp. motor drives both shafts, and carries a load of about 18 horsepower when all the looms are in operation.

Shafts No. 3 and No. 4, which drive heavier conveyor cloth looms, are also about 95 feet in length. Each shaft is equipped with 12 hangers. A 35-hp. motor, delivering about 30 horsepower,

V-BELT INCREASED OUTPUT OF BORING MILL

The boring mill shown in the illustration formerly was driven through a set of bevel gears, which were both troublesome and noisy. In an effort to overcome these disadvantages the gears were replaced with a V-belt drive of special design. Noise was virtually eliminated, maintenance costs were greatly reduced, and it was found possible to take heavier cuts. The results were so satisfactory all around that the same power-drive changes were made on six other boring mills



drives both shafts. No. 5 shaft, which is about 145 feet long, also drives looms and is supported by 20 ball-bearing hangers. Two ball bearings are also used on the jackshaft of the 25-hp. motor that drives this shaft. The motor is fully loaded.

In the warp room the lineshafts and countershafts are equipped with a total of about 18 ball-bearing hangers. This shaft is driven by a 20-hp. motor. The burling room lineshafts and countershafts are supported by 8 ball-bearing hangers. The machines in this room are light, and a 5-hp. motor is large enough to drive them.

Records show that maintenance costs for the 96 hangers is only $190.88 a year, or $1.99 per hanger per year. Spoilage of product due to lubricant dripping has been eliminated, and the oiling required every week or two by the old bearings is no longer necessary. Another worth-while saving has come about through the continuous operation of the shafts; the old bearings frequently ran hot and had to be replaced. This operation involved shutting down the entire line, holding up the work of the machines, and paying the operators for idle time while repairs were made, aside from the direct cost of the repairs.

The direct cost of repairs and maintenance on the 96 old bearings amounted to about $195, while the cost of delays due to their failure averaged $155 a year.

The exact amount of power saved on any particular shaft varies with the belt tension and other conditions, but from observations it is estimated conservatively that the average power saving on all lines that are now equipped with ball bearings amounts to at least 12 per cent.

This reduction in power requirements means a yearly saving of $1,022.42 in the power bill. Adding other economies, there is a total gross saving of $1,372.42 a year. When the operating cost of the hangers is deducted, there remains a net annual saving of $1,181.54, representing a 49 per cent return on the investment.

Mill Varies Speeds for Big Savings

Installation of four variable-speed transmissions solved the problem of driving equipment for pre-shrinking cloth in a textile mill. A rather wide range of operating speeds, with close control, is necessary for this type of operation.

The equipment consists of the starch mangle and three stacks of dry cans, each consisting of 14 cans 23 inches in diameter, for continuous automatic handling of the cloth. In the mangle the cloth is passed around a roll in a tank and through a starching solution, and is then dried on the cans. Many different kinds of cloth are handled. A different speed is required for each kind over an infinite range from a minimum of 12 yards per minute travel to a maximum of 96 yards.

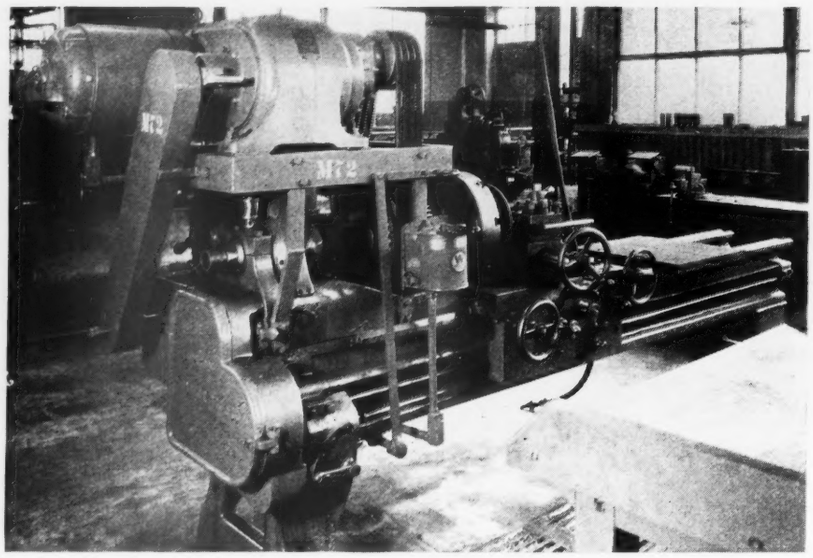
For some requirements, regulated tension must be maintained on the cloth from the mangle to the wind-up at the end of the third stack of cans. In some cases, however, it is desired to shrink the cloth between the first and second, or the second and third, stacks by letting it run slack at these points. This is accomplished by a change in tension obtained through a change in speed between the sections.

To get these results a variable-speed transmission with individual motor drive and remote electrical control directly governs the speed of the mangle, and through the other three transmissions the speed of the entire line. Pushbutton stations are located at both speed and delivery ends so that finishing speeds can be accurately controlled by either operator.

The variable-speed shaft of the first unit is connected by a chain to the constant-speed shaft of the second unit on the first stack of dry cans. This unit in turn drives another unit on the second stack, and it drives the fourth unit on the last section.

Any change in speed of the first unit

Saves with Variable Speed



Savings made by this variable-speed drive added up to $750 the first 6 months

Installation of a variable-speed drive on a belt-driven lathe reduced the time required to machine disks by 40 per cent. In 6 months' time the saving has been more than $750.

Changes involved replacing the cone pulley with a sheave to accommodate the V-belt that connects the lathe and the motorized variable-speed drive. This drive is rated 5 horsepower and has a speed range of 5 to 1. The speed-control hand wheel with which it is normally provided was replaced with a sprocket which is connected by a chain to an extension of the lathe cross-feed mechanism. If desired, the automatic speed control can easily be disconnected, to permit operation at any speed within the range of the drive.

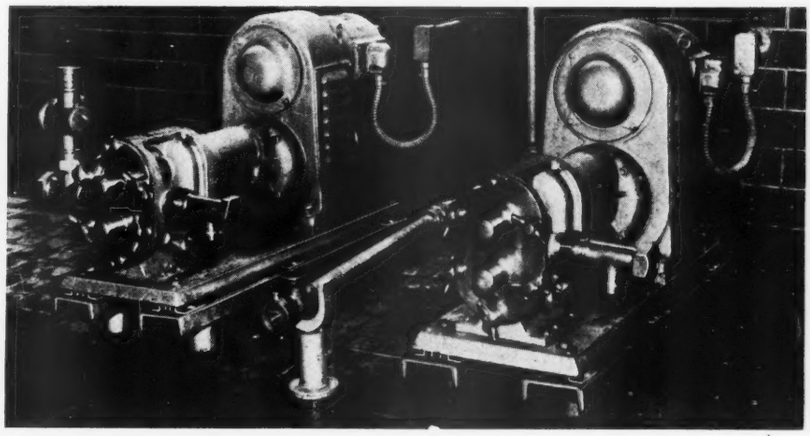
With the automatic control, disks are machined at practically constant speed in feet per minute, because, as the tool moves in towards the center of the disk, the speed of the lathe increases. When the tool is at the center, the disk is being rotated five times as fast as when machining is started, at the outer edge.

The operator now turns out almost twice as much work as was formerly possible. In addition to the direct saving mentioned above, less time is required for subsequent operations because of the better finish produced by the facing operation in the lathe.

results in corresponding changes on each of the other three units. When regulated tension is desired all four units operate in such close synchronism that the cloth is wound up at almost exactly the same speed at which it goes through the mangle.

When it is desired to vary the tension between any two stacks of dry cans, this can be done by changing the speed of any of the three manually controlled variable-speed transmissions.

Change in tension, to provide some degree of pre-shrinkage, in many cases eliminates the necessity of running the cloth through the sanforizing machine more than once, thus saving an extra operation.



An Eastern dairy's milk pumps, now rubber mounted, no longer hum and vibrate

Mounting Stops Vibration

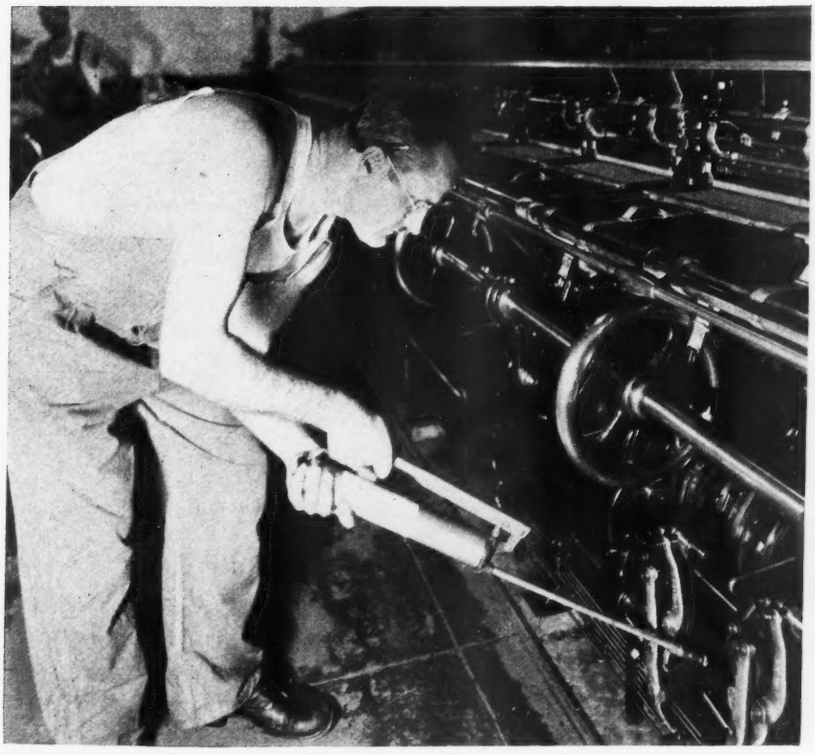
Vibration of milk pumps in one of the plants of a large dairy presented a serious problem. This plant is located in a large Eastern city.

The milk pumps are driven by 3-hp., 1,800-r.p.m. motors. They weigh about 475 pounds each, and when originally installed were bolted to the tile brick floor. Under these conditions the humming and vibration produced during operation were transmitted throughout the plant and to apartment houses within a radius of two blocks. Complaints were so numerous and serious that city officials became interested. Eventually it became a matter of eliminating vibration or discarding pumps.

Study of the problem led to the installation of vibration-isolating rubber mountings. To guard against the possible deterioration that might be caused by the unavoidable splashing of hot and cold milk over the mountings, they are protected by metal channels placed above them.

The mountings cleared up the trouble so successfully that it is intended to use them on all milk pumps operated by this company.

RIGHT LUBRICATION SAVES TIME, ACCIDENTS



Lubricating the intricate machinery in the mills of one of this country's largest hosiery manufacturers used to be an expensive, even dangerous, procedure. A 20-section 45-page legger, for instance, had to be oiled 3 and 4 times daily. Not only that, but oil drippings from the lubricant container were also constituting a fire hazard and making for dangerous footing. Pressure guns with long extensions were then bought. There are no more drips. Equipment is now lubricated once every 3 weeks. Possibilities for savings are obvious

✦

A new leather belt on the main lineshaft that supplies power to spinning frames, increased production 3 per cent with no increase in power cost, because the shaft speed went up 3 per cent. Higher coefficient of friction of the belting material resulted in better grip and less slip.

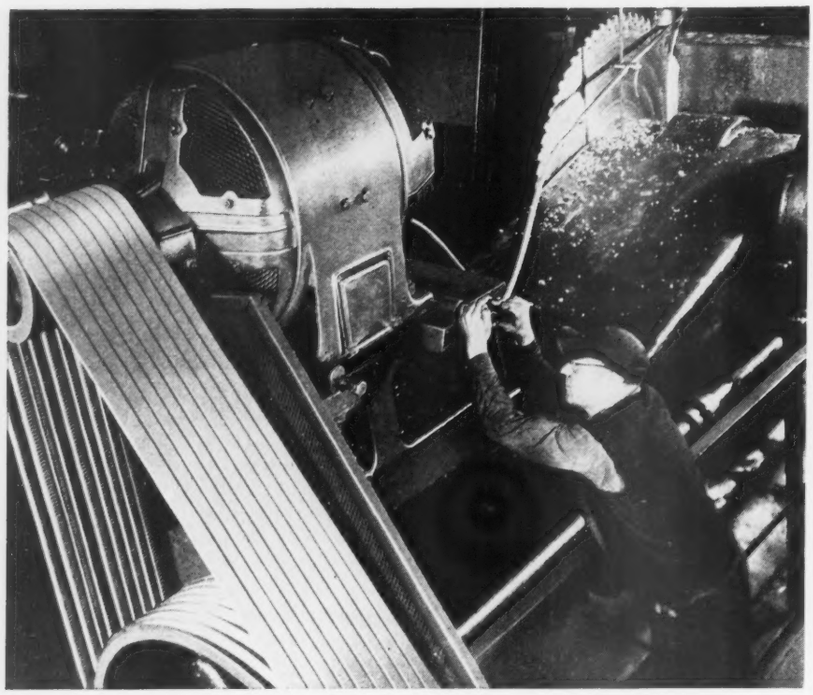
✦

Changed Belts, Better Service, Lower Costs

A Southern sugar mill experienced much trouble with the belts used to drive centrifugals. Operating conditions are severe because of the hot, humid atmosphere and the excessively high temperature of the basket pulley, caused by braking.

Belts used on these drives are 27 feet long and 6 inches wide. Average life of the belts this mill had been using was 106 days on one centrifugal and

8 YEARS OLD, STILL GOING STRONG



These V-belts of special design were installed 8 years ago on a cold saw used for cutting alloy steel. No replacements have been necessary, and the belts are in such good condition that several years' more service is expected from them

92 days on another, where the conditions are more severe. Trials of another type of belt showed that the maximum average life was about 60 days.

Investigation of available types and makes of belts eventually led to the use of a leather belt designed for unusually severe service. Tests showed that it lasted 256 days on one centrifugal and 143 days on the other. Average cost per day was estimated to be 19.5¢, as compared with 27¢ per day for stock leather belts, and 45¢ per day for the type of belt that was formerly in use.

Easy Now to Relocate Power Drive Equipment

Flexibility in changing the location of group-driven production machines is a highly important feature in a Mid-Western plant that manufactures metal specialties. This matter was given careful consideration when plans for a new building were being drawn. Study of the problem led to the installation of metal inserts on 3-ft. centers in the concrete ceiling, when the building was erected. To these inserts are bolted the channel-iron stringers that support motors and lineshaft hangers.

With this spacing of inserts and the use of standardized stringers, it is possible to locate, or relocate, power transmission equipment wherever desired with a minimum of time and effort.

Tough Drive Licked by Endless Rubber Belt

Interruptions due to belt trouble, as well as excessive maintenance costs, were eliminated by changing the type of belt used on a drive that imposes unusually severe conditions.

In this drive, which operates between two floors, the belt makes four quarter-turns around four pulleys. Two of these pulleys are 36 inches in diameter while the other two are only 8 inches. The speed at which this belt travels is 4,700 feet per minute.

Layout of the drive made it impossible to use factory-built endless belts. On the other hand the combination of small pulleys, sharp turns, and high speed caused belt fasteners to pull out frequently. Excessive stretch also caused trouble, made take-ups necessary at short intervals.

Both of the above mentioned troubles were completely eliminated to the accompaniment, incidentally, of worthwhile savings through the installation of a rubber belt of the type that is made endless by splicing and vulcanizing right on the job.

V-Belt Eliminates Drive Trouble in Paper Mill

Drives on vibrating stock screens in a paper mill gave much trouble because of the highly adverse conditions to which they were exposed. Chief among the conditions that seemed to make long life and good service impossible were vibration and exposure to wet pulp, which made the belts slippery and inefficient.

Solution of the difficulty eventually was found to lie in the use of V-belt drives. Operating under the same conditions that caused trouble with the other drives, the V-belts have given satisfactory service.

Belt Runs 7 Years Without Take-Up

A paint manufacturing plant used to have a great deal of trouble with the belt driving the main lineshaft. It transmits 35 horsepower over a center distance of about 22 feet. Overloads are frequent, and conditions in general are so severe that the belts formerly used had a life of about 2 years. Despite the use of an idler to maintain proper belt tension, time-consuming shutdowns to take up stretch were often necessary.

Installation of an endless rubber belt, with removal of the idler, cleared up the former troubles. This belt has given about 3½ times the length of service obtained from the belts previously used on this drive. No take-up has been required during the 7 years it has been in operation.

Saves 20 Man-Hours

Oil can lubrication of a belt conveyor in the textile mill of a large tire manufacturer required four applications a day. Oil was often spilled from the can, spoiling quantities of carded cotton.

An hydraulic hand gun was purchased. Now one oiling per week keeps the conveyor properly lubricated. There are no more oil drippings on the cotton. And so man-hours are saved weekly.

CONTROL PRODUCTION · CUT OPERATING COSTS

BEAT

TIME·SPACE·POWER WASTE!

Learn How the Sensational New Allis-Chalmers Vari-Pitch Speed Changer Gives You More For Your Power Dollar... With Easy, Quick, Time-Saving Speed Changing... to the Exact Speed That Gives You the Greatest Profit-Making Production Efficiencies!

INSTANTANEOUS SPEED CHANGING AT THE OPERATOR'S will — that's the story behind the sensational success of the new Vari-Pitch Speed Changer! Note here the extremely compact mounting arrangement, using the new Allis-Chalmers Paraline base which automatically maintains correct tension on the drive . . . keeps motor on even level . . . adds to the drive's efficiency!

Ask Yourself These Questions — Would your machines produce more if they ran faster . . . or slower . . . or the speeds could be changed at the operator's will to suit changing conditions? Could you get a better finish . . . a more accurate product . . . less spoilage? Would your machines give you 5%, 10%, or even 20% more production if you had the advantages of smooth, instantaneous speed control?

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Get the Facts Now! Don't delay learning about this money-saving Speed Changer! Let this sensational new method save you money in your plant! Get in touch with the district office near you . . . or send for Bulletin 1266A. Learn the facts about the Allis-Chalmers Vari-Pitch Speed Changer that sets new record lows in operating costs . . . controls production . . . beats time, space, and power waste!

Available in sizes from 1 to 75 hp, ratios up to 3¾ to 1, maximum output speed 3500 rpm, the Vari-Pitch Speed Changer is a product of Allis-Chalmers, originators of the Texrope Drive and the Vari-Pitch Sheave.

1010

Vari-Pitch Speed Changers • Texrope V-Belts • Duro-Brace Texsteel Sheaves • Vari-Pitch Sheaves • Standard Cast Iron Sheaves • Adjustable Pitch Diameter Texsteel Sheaves • 2-3-4 Combination Sheaves • Straitline Automatic Motor Bases • Oil Field Drilling Rigs

Belts by Goodrich

TEXROPE DIVISION

ALLIS-CHALMERS

MILWAUKEE·WISCONSIN

No Moans

GARGOYLE SUPER-CYLINDER OILS

Gargoyle Super Cylinder Oils are the products of continuous engineering research dating back to the first steam cylinder oil made.

In your steam engines, these famous steam cylinder oils will—

- ☛ **Provide a power-saving oil film that helps seal stuffing boxes and pistons steam tight.**
- ☛ **Allow the small feeds that help keep efficiency up and oil costs down.**

THE SOCONY-VACUUM man offers you a complete line of lubricants, plus these *exclusives:*
The right lubricant for every machine . . . and new lubricants ahead of new needs . . . developed by world-famous research laboratories through close cooperation with machine builders.

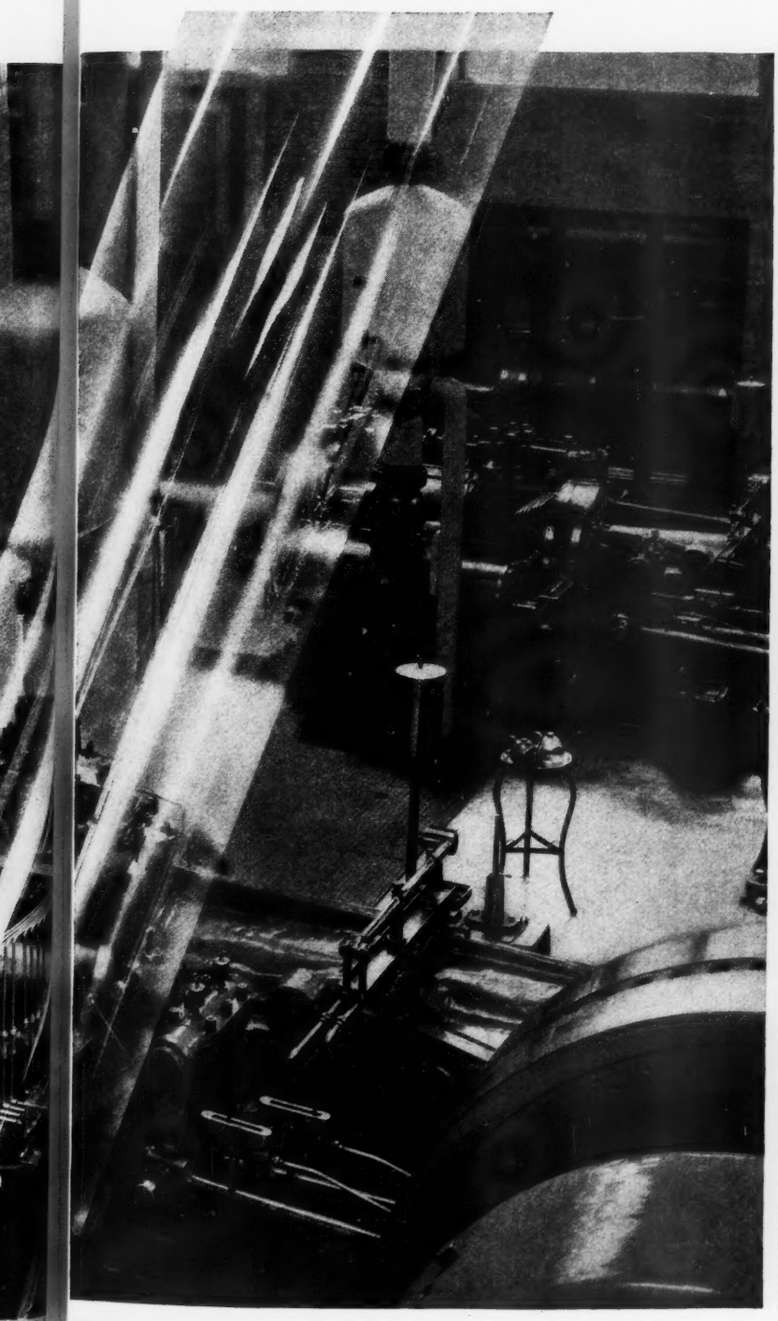
73 years' experience—thousands of case histories—to guide in prescribing the right use of these lubricants to gain Lubrication Profits for you.

World-wide distribution and guaranteed uniformity—the same quality available everywhere.

Another Tough Job for
OIL FILM
Successful operation of every machine depends on the quality of the oil that forms the *microscopic coating* which helps prevent metal-to-metal contact.

or Groans!

FORM A POSITIVE STEAM SEAL_



SOCONY-VACUUM

Industrial Service and Lubricants Help to Lower Costs by

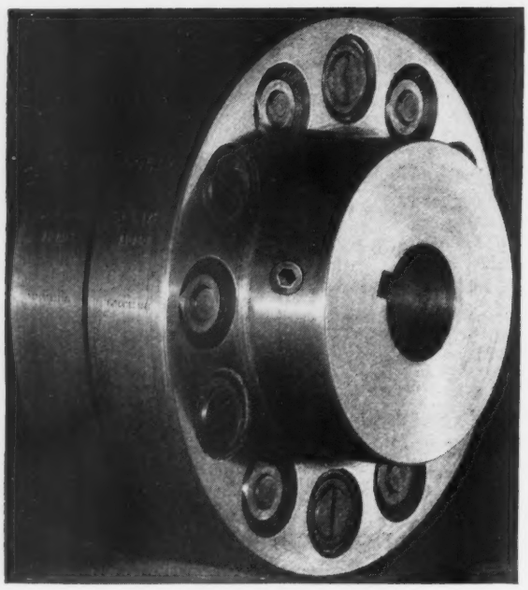
Correct Lubrication

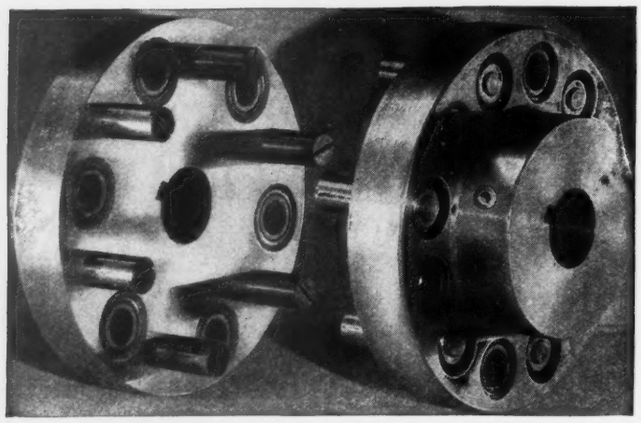
GARGOYLE Lubricants

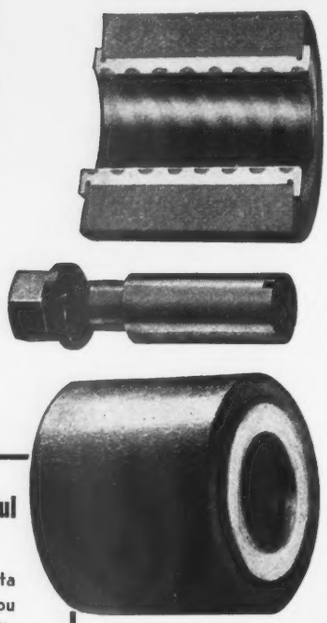
SOCONY-VACUUM OIL CO., INC.

Standard Oil of New York Division · White Star Division
Lubrite Division · Chicago Division · White Eagle Division
Wadhams Division · Magnolia Petroleum Company
General Petroleum Corporation of California

WHY YOU CAN THROW AWAY YOUR OIL CAN WHEN YOU USE AJAX FLEXIBLE COUPLINGS . . . .





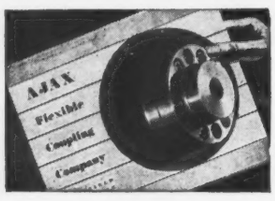


ABOVE: — Showing Ajax Flange Assemblies before mating. LEFT: — Cross section showing rubber bushing and flanged graphite-bronze, self lubricating bearing.

Men who have to keep machines running appreciate how Ajax rubber bushed graphite-bronze bearings eliminate difficult lubrication problems set-up by centrifugal force and constant flexing at high speeds and heavy loads. Ajax couplings combine positive drive, resilient protection against misalignment, free end float, no noise — no backlash, no lubrication worries.

Alloy steel studs hardened and ground insure accuracy. No noise, no backlash. Positive drive . . . no metal flexing parts to wear or fatigue.

Ajax Rubber Bushings absorb misalignment. Bushing cold-vulcanized to bronze bearing and flange,—no friction, scuffing, shear or wear on rubber.

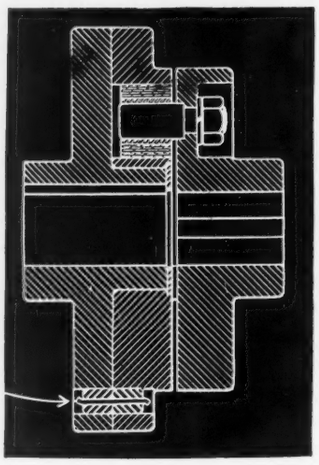


Write For This Useful Book

This helpful Ajax Data Book makes it easy for you to select correct size—write for your copy.

HOW AJAX SHEAR PIN COUPLINGS Protect Against Overloads

Easily replaceable Shear Pins held in hardened steel bushings eliminate costly damage and shutdowns. Sheared Pins are replaceable in a few minutes for a few cents.



AJAX FLEXIBLE COUPLING CO.
62 English St. Westfield, N. Y.

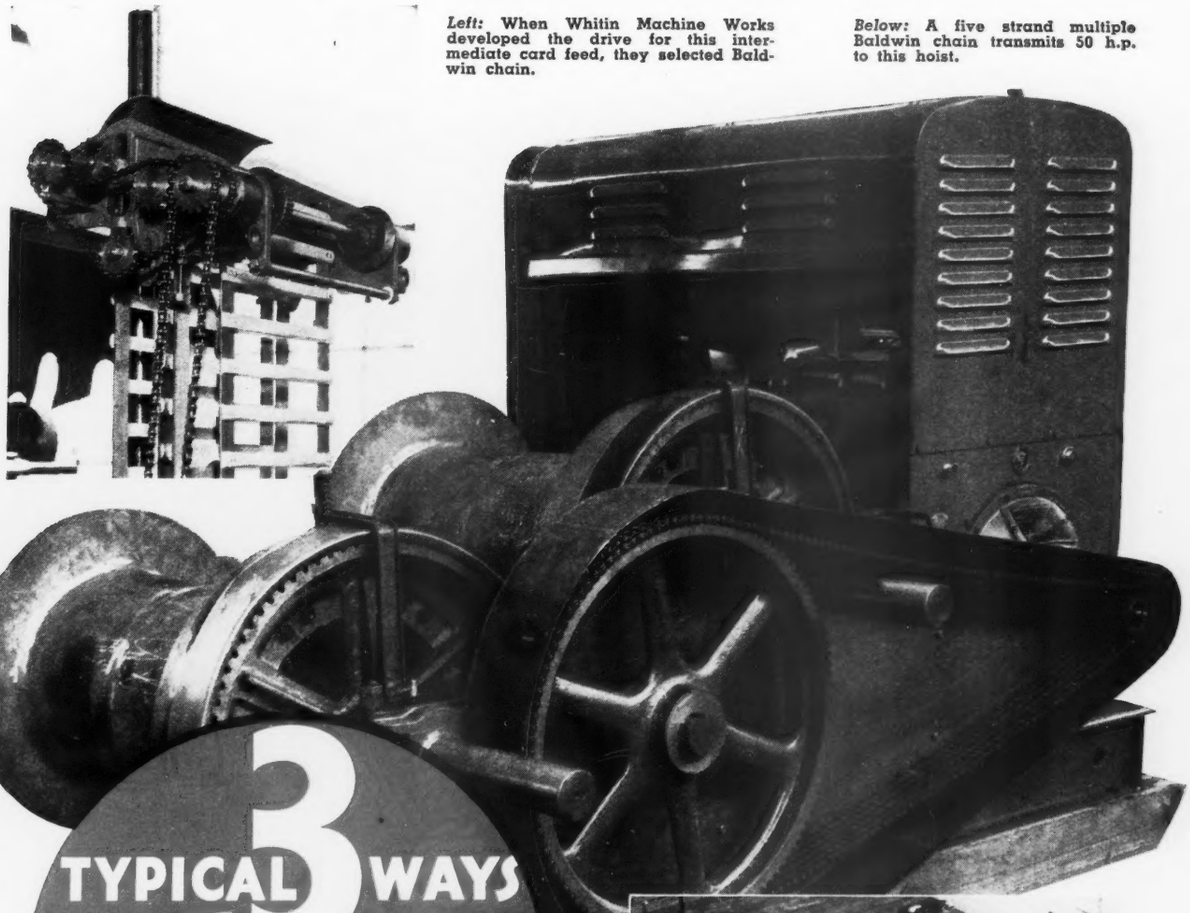
Incorporated 1920

Akron, Ohio	Dallas, Tex.	Milwaukee, Wis.	Salt Lake City, Utah
Atlanta, Ga.	Denver, Colo.	Minneapolis, Minn.	San Francisco, Cal.
Boston, Mass.	Detroit, Mich.	Montreal, Que.	Seattle, Wash.
Buffalo, N. Y.	Indianapolis, Ind.	New York City	Spokane, Wash.
Chicago, Ill.	Kansas City, Mo.	Philadelphia, Pa.	Stuttgart, Ark.
Cincinnati, Ohio	Los Angeles, Cal.	Pittsburgh, Pa.	Syracuse, N. Y.
Cleveland, Ohio	Louisville, Ky.	St. Louis, Mo.	

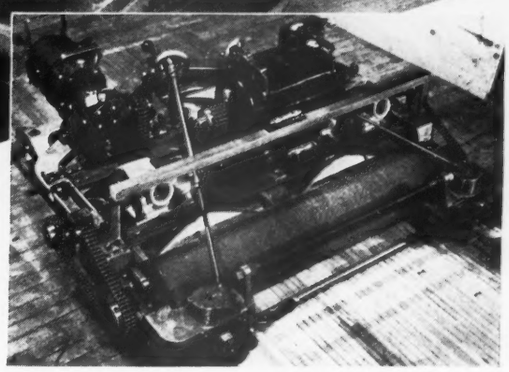
Also Manufacturers of Reciprocating Shakers and Screens

Left: When Whitin Machine Works developed the drive for this intermediate card feed, they selected Baldwin chain.

Below: A five strand multiple Baldwin chain transmits 50 h.p. to this hoist.



3 TYPICAL WAYS To use Chain



This bowling alley surfacer presented four different opportunities to use Baldwin chain.

A FEW QUALITIES OF ROLLER CHAIN

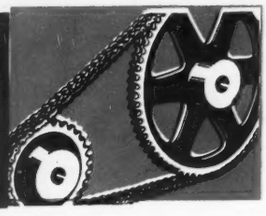
cannot slip
absorbs shock
resists heat, corrosion
unaffected by dirt, dust
any power, any speed
operates quietly
low maintenance
lowest cost

★ Baldwin roller chain makes a perfect primary drive, because it's positive, quiet, efficient and almost entirely free from maintenance and repair costs. Second: It is ideal for drives where the load may vary sharply, because it is rugged enough to stand overloading. Third: It is indispensable where material in process must move at a definite pre-determined speed.

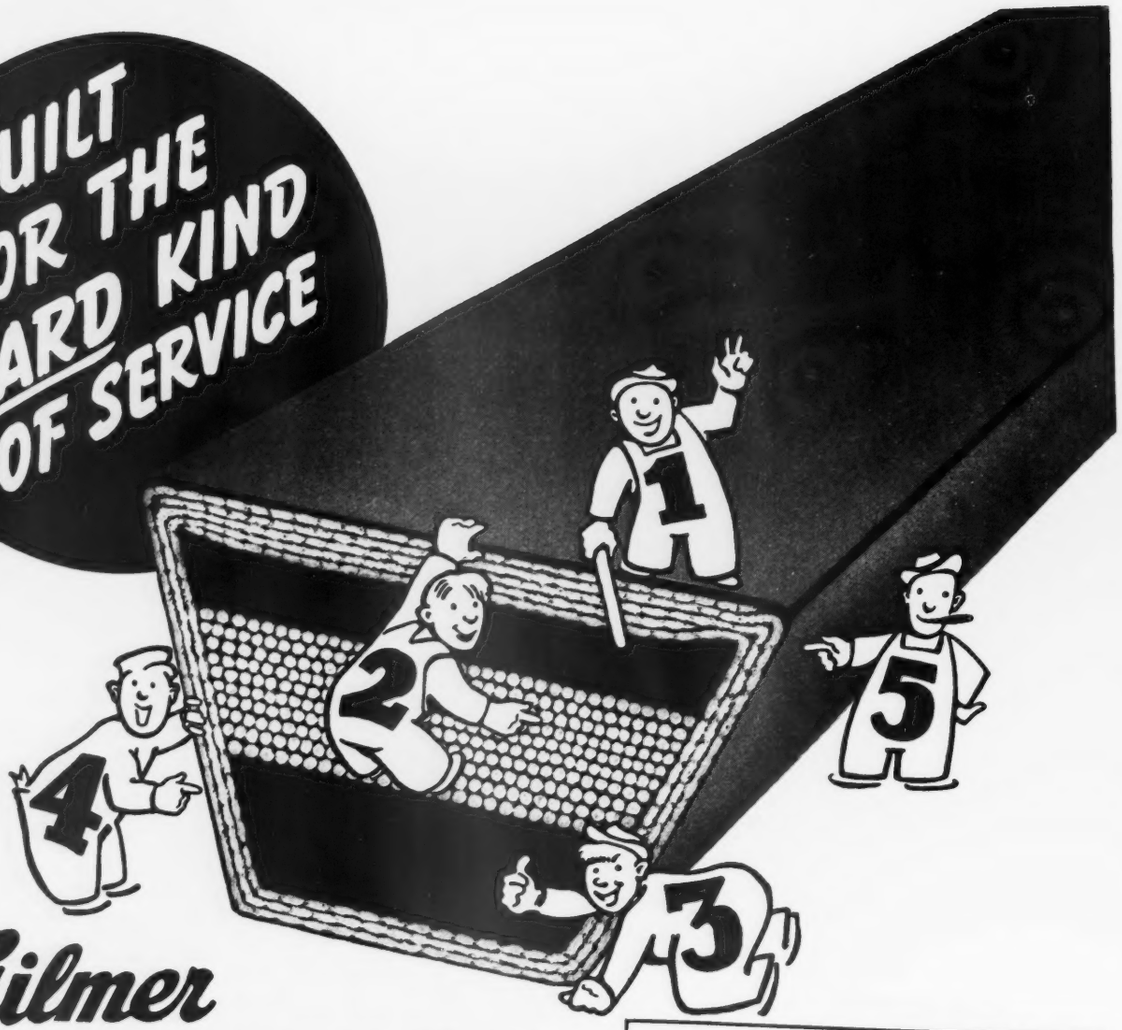
If you have any power transmission or material handling job in mind, it is probable that Baldwin roller chain can handle it to mighty good advantage. It's worth remembering, too, that in 30 years Baldwin engineers have developed a lot of application ideas that may bring you real savings, if you call the B–D Man. BALDWIN–DUCKWORTH Division of Chain Belt Company, Springfield, Massachusetts. Factories at Springfield and Worcester, Mass.

BALDWIN-DUCKWORTH

DIVISION OF CHAIN BELT COMPANY



BUILT FOR THE HARD KIND OF SERVICE



Gilmer "PRECISION-PLUS" V-BELTS

Only the Gilmer Gang can give you the famous *"Gilmer grip"*— pressure that *prevents slippage*... pressure that *creates and multiplies pulling power!* GO TO GILMER for belts that are built for *hard* service by engineers who *specialize* in belts.

ORDER GILMER BELTS FROM YOUR DISTRIBUTOR

Factory Branches and Warehouses:
Atlanta, Ga., 95 Pine Street
Chicago, Ill., 351 East Ohio Street
Des Moines, Iowa, 414 12th Street
Houston, Texas, 1015 N. San Jacinto Street
New York, N. Y., 50 Church Street
Newark, N. J., 115 Edison Place
San Francisco, Cal., 510 Bryant Street
Seattle, Wash., 307 Maritime Building
Tulsa, Okla., 3012 E. 15th Street

Another Gilmer Belt with the world-famous *"Gilmer grip"* is KABLE KORD . . . that hugs flat pulleys *tighter* with the no-slip grip!

ONLY GILMER "PRECISION-PLUS" V's GIVE YOU THESE 5 FAMOUS FEATURES!

Gilmer Top Tension Rubber— Tough, resilient. Cuts out costly misfits.

Gilmer Rubber-locked Pulling Cords— Patented construction, concentrating brute strength in thin section, makes cords ride parallel, without twisting, under pressure.

Gilmer Heat-resisting Bottom Rubber—Specially developed by Gilmer to insure cool running at high speeds and eliminate "squashing" in the groove.

Gilmer Heavy Jackets—Protect the belt's vital working parts from oil, dirt, and grease, making Gilmers last three times as long.

Gilmer Controlled Stretch—Pre-tested, to guarantee permanently matched working lengths on every job.

L. H. GILMER COMPANY
TACONY, PHILADELPHIA

THE OLDEST FIRM OF RUBBER FABRIC BELT SPECIALISTS

Lubricate your plant with Lubriplate —the New Principle Lubricant!

Are your lubricant bills running too high? Are replacements due to faulty lubrication excessive? Are you worried about noisy gears, hot running bearings or oil-dripping chains?

Then Lubriplate is your answer. Try Lubriplate on the *toughest* lubricating job in the plant. See for yourself how this *new principle* lubricant stops noise—ends dripping—cools running temperatures—slashes lubricant consumption—reduces labor charges to a minimum.

7 QUICK FACTS

1. *Lubriplate produces a wear-resisting bearing surface.*
2. *Lubriplate resists rust corrosion and pitting.*
3. *Lubriplate reduces friction, thus lowering maintenance costs and power costs.*
4. *Lubriplate is white and clean.*
5. *Lubriplate outlasts ordinary lubricants many times.*
6. *Lubriplate is economical—a little goes a long ways.*
7. *Lubriplate is available in fluid and grease types for every need.*

1 SAVE WORK

A large aluminum company* was forced to lubricate coilers, shears and presses from 2 to 3 times each shift. With Lubriplate, a *single lubrication* per shift was all that was needed. In addition, 1 pound of Lubriplate goes as far as 3 pounds of the former lubricant.

2 SAVE WORRY

A leading food packer* was faced with a mean lubricating problem. Oil was dripping badly from a single long conveyor which wove all about the shipping floor. The conveyor squeaked constantly. The day Lubriplate was introduced, squeaks and dripping stopped—*completely*. What's more, the Superintendent reports that "Lubriplate lasts a surprisingly long time. Now we are using Lubriplate on many applications."

3 SAVE MONEY

Prior to using Lubriplate, a leading vulcanized fibre company* found that *one* gear consumed 36 gallons of oil, required 4 gear replacements and $6 replacement labor over a six months period—for a total cost of $79.82. During the next 6 months Lubriplate was used at a total cost of $2.50. No replacements. No labor charges.

*NAMES ON REQUEST

TRY LUBRIPLATE FREE

Lubriplate can make the same large savings in *your* plant. Prove this statement—*yourself*. Send us the details of the worst lubrication "twister" in your plant. We'll see that you receive enough Lubriplate to straighten it out, free. Write today.

LUBRIPLATE DIVISION OF

FISKE BROTHERS REFINING CO. • NEWARK, N. J. • TOLEDO, OHIO

Dealers from Coast to Coast

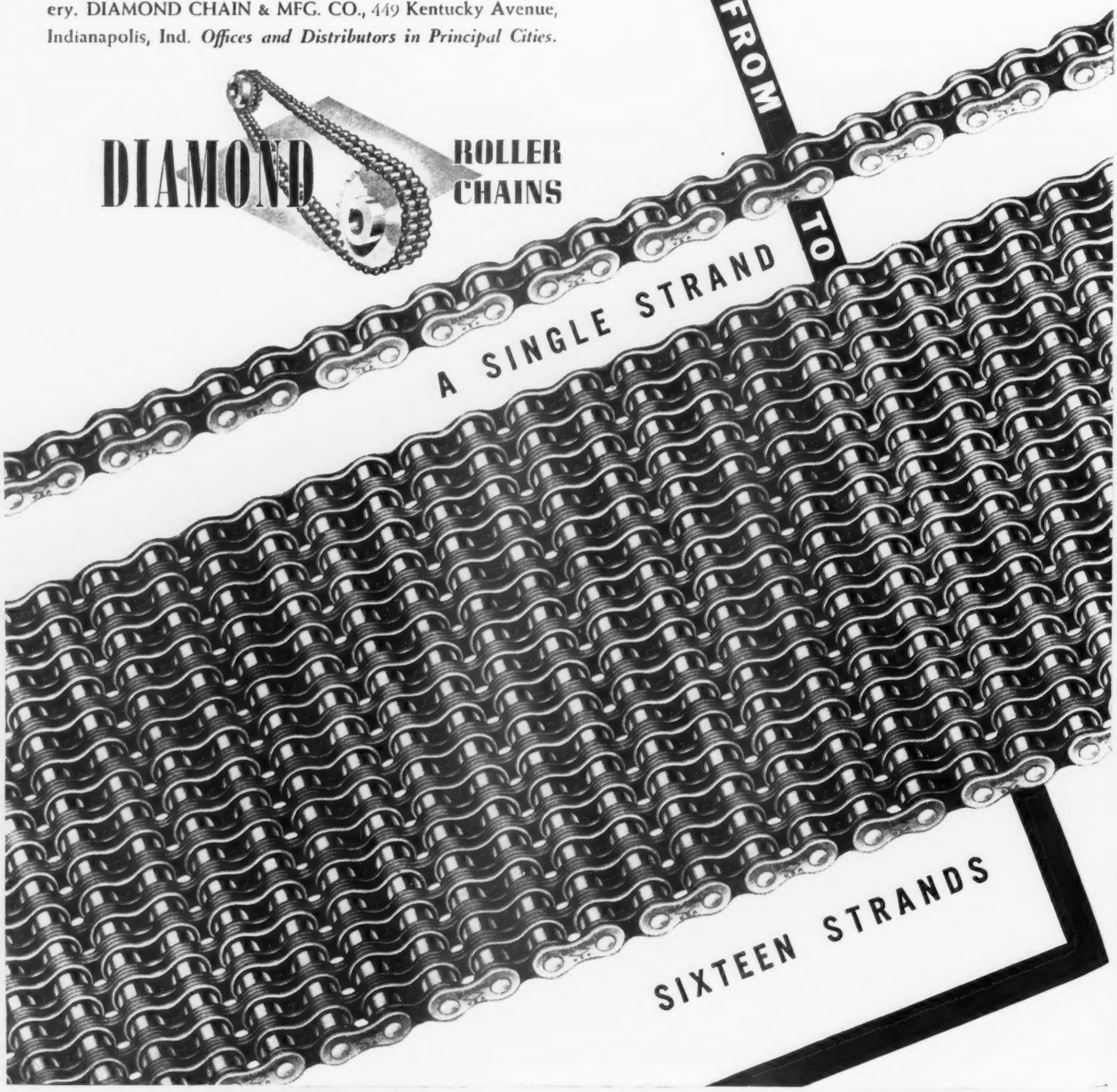
IT'S THE DRIVE YOU USE THAT MAKES THE DIFFERENCE

From One Strand to 16 Strands

● To meet the many and varied power transmission requirements of industry—for slow, medium or high speeds—small or large capacities—fractional h.p. up to 1200 h.p.—Diamond Roller Chain Drives are available in single and multiple strands—from 1 to 16—in pitches from ⅜" to 2½"—and in any lengths. • Transmission efficiency remains constant and unusually high—over 98%—because with Diamond Drives "roll" replaces "slide," eliminating friction losses. • For motor drives and machinery applications, Diamond roller-bearing type Chain is found where the maximum in power transmission is desired—in the efficiently operated plants and on the finest machinery. DIAMOND CHAIN & MFG. CO., 449 Kentucky Avenue, Indianapolis, Ind. *Offices and Distributors in Principal Cities.*

ROLLER CHAIN DRIVES FOR FRACTIONAL OR THOUSAND HORSEPOWER

DIAMOND ROLLER CHAINS



IT'S THE DRIVE YOU USE THAT MAKES THE DIFFERENCE

OVER 250,000 KORFUND VIBRATION CONTROL SUCCESSFUL INSTALLATIONS

PREVIEWS of PROVEN PROFITS

FROM ACTUAL INSTALLATIONS OF KORFUND VIBRATION CONTROL

ONE of the safest methods of judging the value of a product in industry is to examine its performance under actual operating conditions. Who is using it, and what kind of results are they getting? From more than a quarter million installations of KORFUND VIBRATION CONTROL, these case histories have been selected to answer the above questions. Regardless of your type of plant or machinery, KORFUND VIBRATION CONTROL has been used successfully to improve operating efficiency, reduce waste and maintenance expense and increase earning power very appreciably.

Representative users are listed below. Typical results are shown at the right, opposite the illustrations.

Representative Users

American Can Company
American Tobacco Company
Beech-Nut Packing Company
Carnegie Steel Company
Chrysler Corporation
Corning Glass Works
Du Pont de Nemours Company
Eastman Kodak Company
General Motors Corporation
General Electric Company
H. J. Heinz Company
Hyatt Roller Bearing Company
National Lead Company
Packard Motor Car Company
Pratt & Whitney Company
Procter & Gamble Company
Republic Steel Company
U. S. Aluminum Company
Western Electric Company
Westinghouse Electric & Mfg. Company
Wright Aeronautical Corporation

10% GREATER EFFICIENCY

Correct Vibration Control can improve operating efficiency as much as 10% especially under punch presses, hammers and similar machines with impact loads.

REJECTIONS MINIMIZED

For precision tools operating in the vicinity of vibratory machines Vibration Control is vital to keep spoilage within economical limits. Accurate work is impossible with vibration.

CUTS MAINTENANCE COSTS

Every dollar saved on maintenance is operating profit and there is no quicker method of reducing wear and breakdown than by isolating destructive vibration.

LESS ACCIDENTS, MISTAKES —FROM EMPLOYEE FATIGUE

For maximum personnel efficiency, Vibration Control is as vital as proper lighting and ventilation. Medical authorities and life insurance companies recognize vibration as a serious industrial problem costing thousands of dollars annually.

● For complete information, request your complimentary copy of the informative

KORFUND VIBRATION CONTROL ENGINEERING DATA

It is a convenient reference file covering all types of resilient mountings and their commercial applications. Valuable data.

KORFUND
COMPANY, INC.

48-25 THIRTY-SECOND PLACE **LONG ISLAND CITY, N. Y.**

HAVE YOU A "HOT OIL" PROBLEM?

Consult HARRISON

WHEREVER the wheels of industry turn, there is heat—and where this heat is not properly controlled, excessive wear necessitates frequent replacements, and upkeep cost of machinery is increased.

Specifically designed for the purpose, HARRISON HEAT EXCHANGERS maintain oil temperatures within the ranges required for proper lubrication, thereby reducing wear and increasing efficiency.

Investigate the possibilities of reducing costs with—

HEAT EXCHANGER Customers in the "Industrial" Field

Elliott Co.
Bliss, E. W., Co.
General Electric Co.
Reed Prentice Corp.
Terry Steam Turbine Co.
Hydraulic Press Mfg. Co.
French Oil Machinery Corp.
Lake Erie Engineering Corp.
New Departure Div., G. M. Corp.
Worthington Pump & Machine Co.
New Britain Gridley Machine Tool Co.
Birdsboro Steel Foundry & Mach. Co.
Kingsbury Machine Works, Inc.
Westinghouse Elec. & Mfg. Co.
DeLaval Steam Turbine Co.
Baldwin-Southwark Corp.
Farrell-Birmingham Co.
Williams White, Inc.
Buffalo Pumps, Inc.
Ingersoll-Rand Co.
Gleason Works

HARRISON HEAT EXCHANGERS

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, Lockport, New York

The PAY-OFF is the PULLING POWER of Dayton COG-BELTS *with Daytex Cord*

Since conversation won't cut production costs, you may be bored stiff when we tell you how Dayton's famed technical laboratories spent seven years of tireless research developing Dayton V-Belts with Daytex Cord in their neutral axis section.

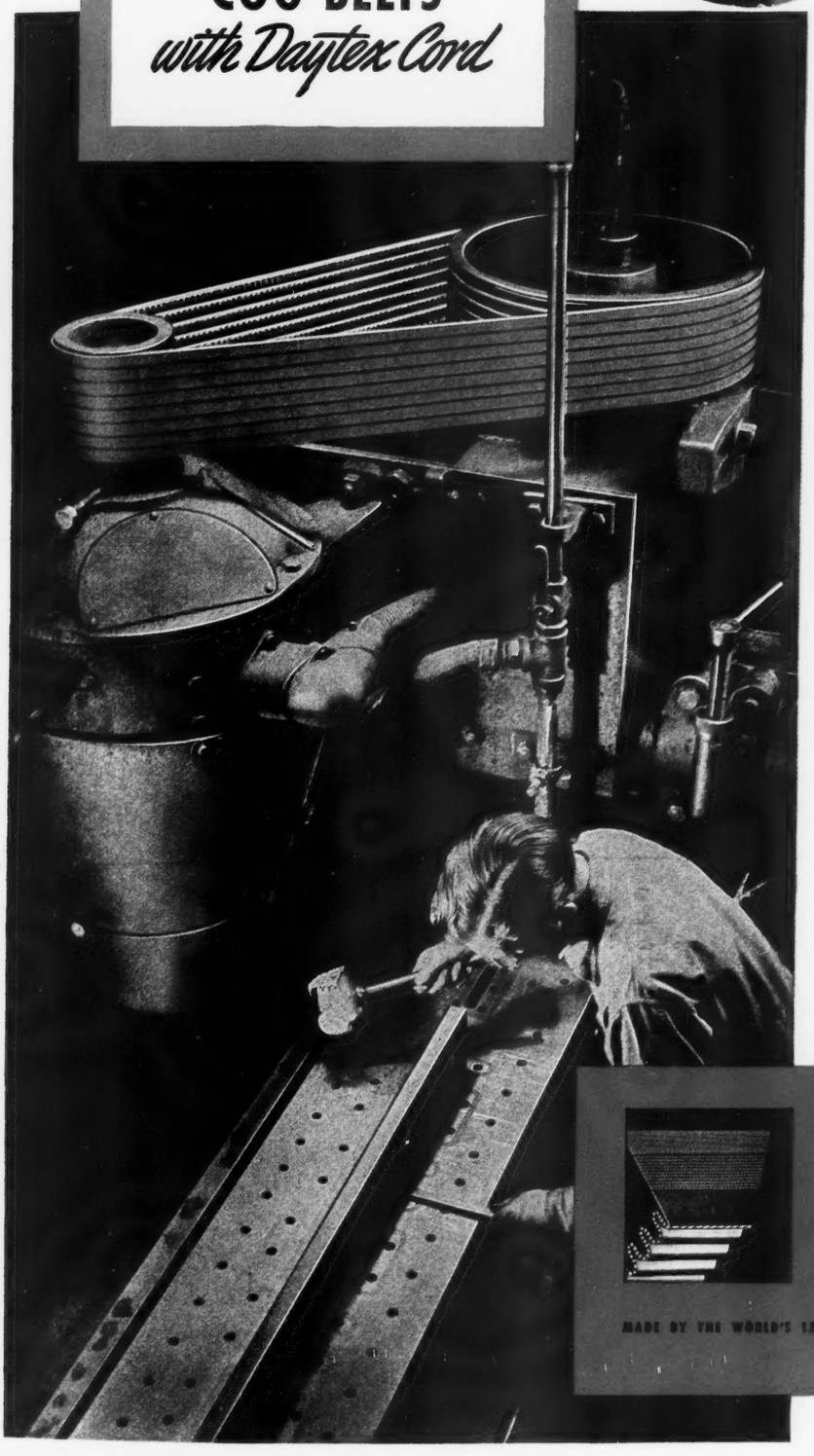
You may even stifle a yawn as you hear about the exhaustive laboratory tests which *prove beyond question* that Daytex Cord has less stretch, longer life and greater strength than the best comparable cord *not* Daytex Processed.

But unless you are allergic to profits you will sit up straight and listen to this brass tack fact—the pay-off is the pulling power of these new Dayton Cog-Belts with Daytex Cord, and *that* means a boost for your bank roll.

So remember this, field applications under all conditions in all types of industries, in all climates and places prove that Dayton V-Belts with Daytex Cord *take and like* constant high speed flexing to give you greater power and lower cost per day, per month or year.

Remember that Dayton V-Belts are outstanding in basic design because they are built to bend with patented cog construction. They reduce adjustments to a negligible minimum. They work on short centers and save space. They save you time, they save your machinery and they save you money. So why not ask your local Dayton distributor for catalogs, data and "The Picture Story of Daytex Cord?"

THE DAYTON RUBBER MFG. CO.
DAYTON, OHIO



Dayton
COG-BELT DRIVES
WITH DAYTEX CORD

MADE BY THE WORLD'S LARGEST D MANUFACTURER OF V-BELTS

Quick Ways to Profit:

Use Rhoads TANNATE Leather Belting!

33 1/3% Increase in Output

on paper mill chipper is the story of profit of a TANNATE Belt installed in 1929. Lower cost per cord chipped saves many dollars annually.

TANNATE Belt pays for itself in 3 months on Drive

Driving a cinder block tamping machine, TANNATE replaced a rubber belt . . . stepped up production by 60% . . . paid for itself in the first three months . . . now clears a nice profit every day of its use!

Using TANNATE — Average yearly belt cost is less than $1.00 per belt!

Twelve year records covering its constant use on Model E Looms in South Carolina textile mill show how amazingly TANNATE has slashed average annual belt cost!

TANNATE Triples Belt Service on Rayon Mill Drive

Best record of other belts on this drive was only 130 days service with 3 to 5 repairs per belt. TANNATE already has tripled the service . . . shows bright prospects for considerable additional life . . . and maintenance charges have been but negligible!

2,052,000,000 Revolutions . . . Still "many more years of service" in it!

A TANNATE Belt in operation seven and a half years for a Florida ice company already has run 47,500 hours with only one shortening (after more than four years service) and with practically no maintenance. Says the engineer, "the belt is in good shape and we should get many more years of service out of it!"

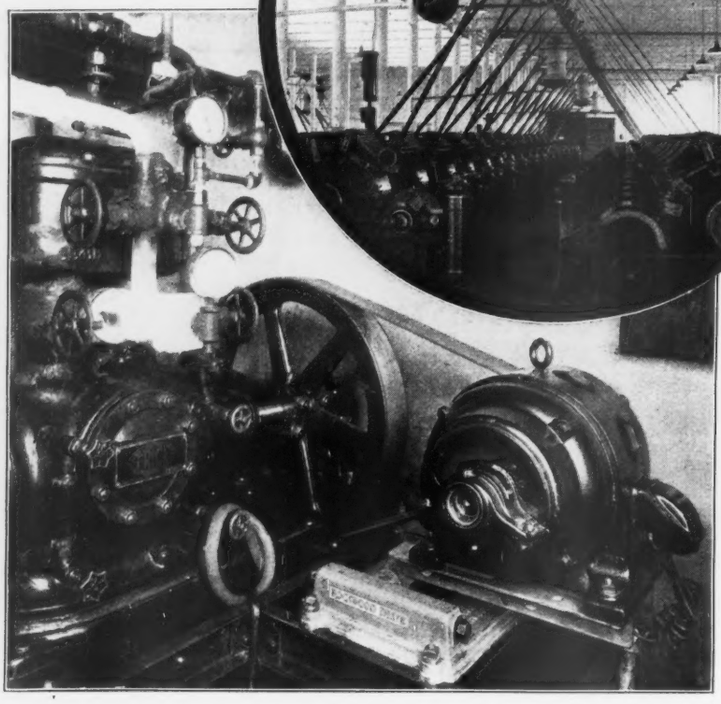
TANNATE Gas Compressor Drive reduces slip . . . Increases transmitted H.P. . . . eliminates time losses . . . reduces maintenance cost

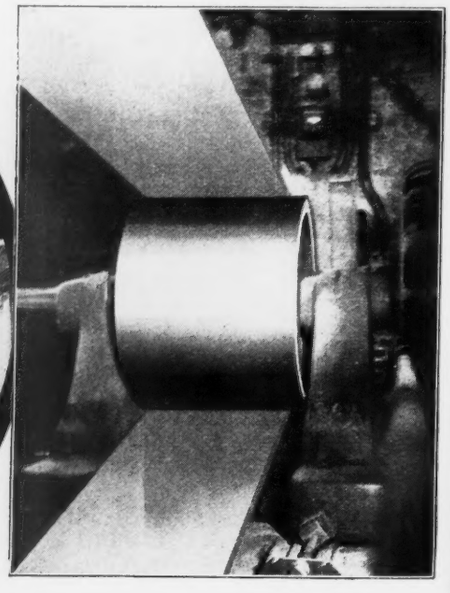
An oak tanned belt formerly used on this drive slipped badly, grew progressively worse . . . carried but a fraction of the load . . . had to be repaired on the average of once every four days! TANNATE has run perfectly since the first turnover 5 years ago . . . without a minute's shut-down for repairs and with an occasional dressing while running the only maintenance required!

Paper Mill Drive celebrates 10th trouble-free birthday

This belt has withstood the test of 75,000 operating hours, with only four take-ups and with practically no maintenance. Says this user, "The life of the belt seems indefinite."

The surest way to save is the Tannate Way!





How many of your Drives can show results like these above?

Can your drives match these records? Are you getting maximum performance at lowest cost?

If not—ask how! Our representative can show you the profit possibilities in TANNATE for your drives. There's no obligation! Just write—

J. E. RHOADS & SONS

35 N. SIXTH ST., PHILADELPHIA, PA.

New York Chicago Atlanta Cleveland

Factory and Tannery — Wilmington, Delaware

RUGGED

SHAFER WELDED STEEL HOUSINGS
provide compact and exceptionally rugged mountings for the rugged Shafer radial-thrust roller bearing. Both standard duty and super-sealed pillow blocks are available in this type. The Shafer Concave roller design combines self-alignment, radial-thrust capacity, and simple adjustability as inherent features of the bearing itself.

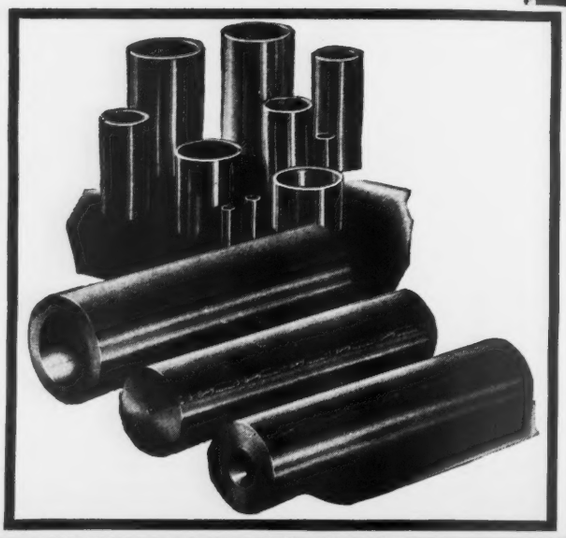
SHAFER BEARING CORPORATION
35 EAST WACKER DRIVE • CHICAGO, ILLINOIS

CONCAVEX

Available in a full range of sizes: Pillow Blocks • Welded Steel Pillow Blocks • Flange Units • Take-up Units • Hanger Boxes • Cartridge Units • Flange-Cartridge Units • Duplex Units • Conveyor Rolls • Radial-Thrust Roller Bearings

SHAFER *Radial-thrust* **ROLLER BEARINGS**

THE BRONZE BAR WITH THE *Bored* I.D.



● Precision boring is responsible for the smooth finish and concentricity of Bunting Bearing Bronze Tubular Bars. Only a 1/64" cut is necessary to finish to desired bearing size. Ask the leading wholesaler in your vicinity.

● Nine times out of ten you can get the size of *finished* bearing you want from the complete stocks of Bunting Standardized Bronze Bearings carried by leading wholesalers everywhere. They are ready for assembly meeting practically all mechanical production and maintenance requirements. Write for catalog.

Send in your blueprints for quotations on special designs and alloys. Ask for free counsel on bearing metallurgy and engineering.

THE BUNTING BRASS & BRONZE CO.
TOLEDO OHIO
Warehouses in All Principal Cities

BUNTING

BRONZE BUSHINGS
PRECISION BRONZE BARS

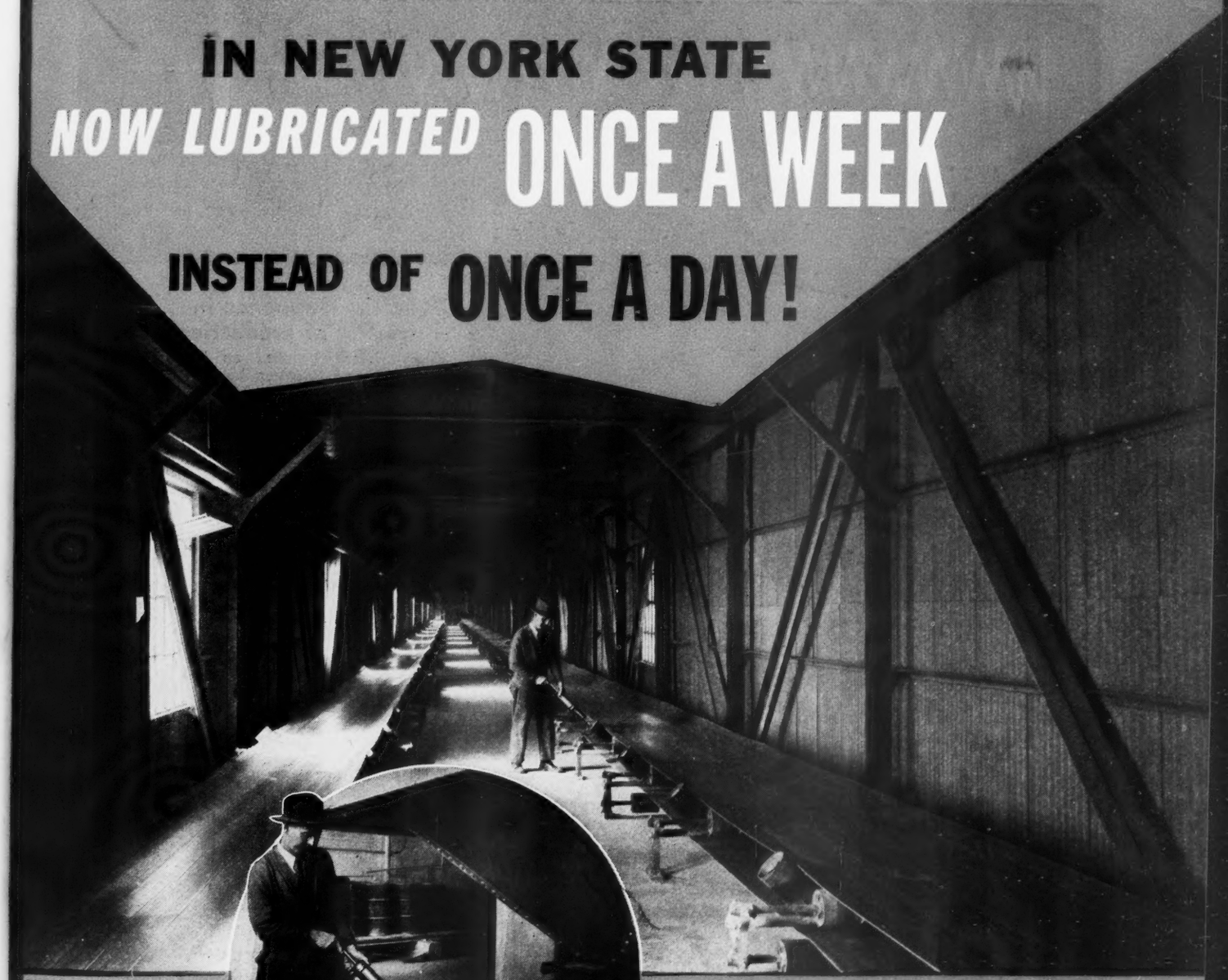
BEARINGS
BABBITT METALS

THE LONGEST CONVEYOR

IN NEW YORK STATE

NOW LUBRICATED ONCE A WEEK

INSTEAD OF ONCE A DAY!



One mile and a half straight ahead—that's New York State's longest conveyor, riding on 2500 Alemite-lubricated idler bearings!

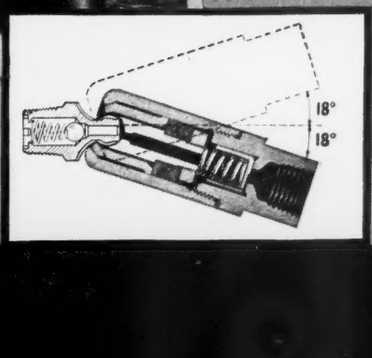
Right: Alemite Hydraulic Gun is quickly refilled from the handy Alemite Filler Tank. Below: This hopper handles 20,000 bushels per hour; operator is Alemiting main bearing.

Conveyors of All Kinds Operate More Economically, More Dependably With Alemite Lubrication

THIS mile-and-a-half long conveyor in the New York State Grain Elevator at Brooklyn handles 20,000 bushels of grain per hour! Each of its idler bearings *formerly required oiling every day. Now,* with an Alemite Hydraulic Fitting on each bearing and Alemite No. 33 Solidified Oil on the job, *one "shot" a week* from an Alemite Hydraulic Gun is ample!

Similar savings have been made with other types of conveyors, *in every kind of industry.* A better job of lubrication with less frequent application—bearing failures avoided and maintenance costs reduced—these are common reports from conveyor owners.

Learn what Alemite Lubrication can do to cut *your* conveyor operating costs! There's an Alemite System, *power or manually operated,* to fit your requirements exactly. Our latest catalog gives you complete facts. Write for your FREE copy today.



Right: See how coupling of Alemite Hydraulic Gun grips nose of Alemite Hydraulic Fitting to form a leakproof seal. Gun arcs as much as 18° any direction without breaking seal.

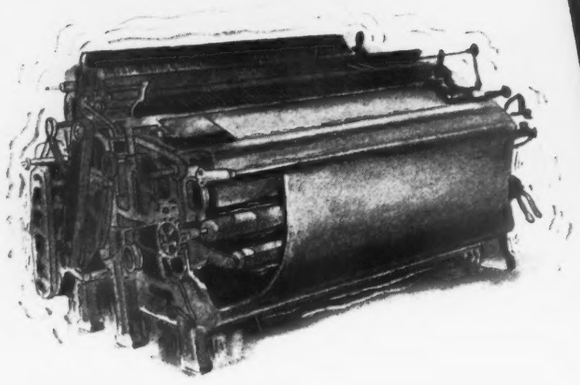
ALEMITE—*A Division of Stewart-Warner Corporation, 1870 Diversey Parkway, Chicago, Ill. Stewart-Warner-Alemite Corporation of Canada, Ltd., Belleville, Ont.*

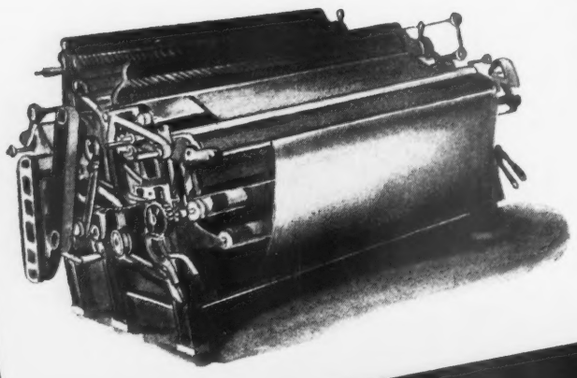
ALEMITE

REG. U. S. PAT. OFF.

WORLD'S LARGEST MANUFACTURER OF LUBRICATION PRODUCTS

ISOLATE VIBRATION AND SOUND WITH FELTERS CERTIFIED FELT





CERTIFIED FELT Made by FELTERS COMPANY INC Tested under the supervision of our own Laboratory

"SEE the difference in **quality of production."**

Any machine installed on Unisorb runs smoother and operates better, the result being that the quality of production is improved.

•

"FEEL the difference in **production costs."**

Machinery wears quickly due to intensified vibration, causes unnecessary shut-downs when a part fails to operate. Production losses due to these shut-downs can be materially lessened by Unisorb installation.

•

"HEAR the difference in **production efficiency."**

Transmitted vibration causes unnecessary noises which are eliminated by the installation of Felters Certified Unisorb.

•

"SAVE the difference in **Maintenance."**

Under the stress and strain of high production machinery needs more repairs. When the vibration transmission is lessened by the Unisorb installation the repair costs drop.

•

"FELTERS serves your industry **—ALL industry."**

Whether it is oil seals, packing, vibration felts, sound insulation or any other industrial felt use, Felters supplies it to industry. There is also a Felters Research Laboratory for discovering new uses, improvements on old uses, and checking customers' specifications. If you have a problem that could be solved by felt, consult our Research Laboratory.

•

THE FELTERS COMPANY, Inc.

210 SOUTH ST., Dept. AB BOSTON, MASS.

Offices: New York, Philadelphia, Chicago, Detroit, St. Louis
Sales Representatives: Dallas, Los Angeles, Louisville
Mills: Johnson City, N. Y., Millbury, Mass., Jackson, Mich.

SPECIFY FELTERS CERTIFIED FELT . . .

• We have published an interesting booklet showing a few of the hundreds of Unisorb installations we have made. Write for your copy of this Vibration booklet today on your company letterhead.

SORRY— NO GOOSE GREASE

A COAL-MINE car journal and a skip-drum bearing *both* need lubricating. And neither does well on makeshifts.

A crusher gearbox and a centrifugal pump shaft; a ship's stern tube and a bucket-conveyor tumbler—the list is a yard long and there are also variables in operating conditions and mechanical design which may change lubrication specifications a score of times in one company.

Now—while we don't supply "goose grease," we *do* have scores of different greases in the Shell line. There is a right grease for every lubricating need. It costs no more than the wrong grease and usually costs less.

After all, it is not how much a plant can save on its grease bill; it is the dollars saved on repairs, replacements and shutdowns and the dollars saved on reduced friction which really count.

The services of Shell's lubrication specialists go along with its complete line of greases. This staff, thoroughly trained in solving lubrication problems, is available without charge anywhere in America.

SHELL

SHELL INDUSTRIAL GREASES

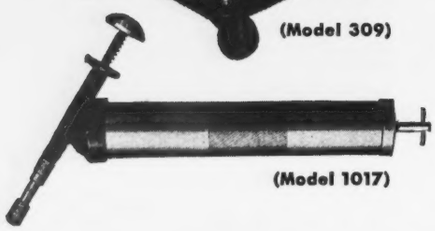
ONE HAND

is all that is required to operate a Model 1016

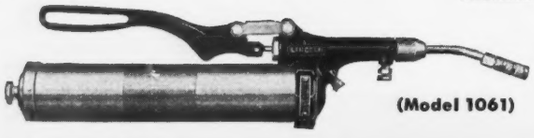
LINCOLN GREASE GUN

(Illustration above shows Model 1016 Utility Gun being used to grease lathe)

(Model 309)



(Model 1017)



(Model 1061)

Lincoln Equipment makes it easy to grease machines quickly, thoroughly and economically. If you do not know about this equipment, it will pay you to make inquiries *NOW*.

Lincoln makes a wide range of equipment for the most efficient application of grease lubricants, and you undoubtedly will find in the line units which are exactly suited to your requirements. A few of the guns are described below.

MODEL 309 TWIN CYLINDER AIRLINE LUBRIGUN (shown at left) dispenses lubricant directly from an original 100-lb. drum. This unit is capable of handling semi-solid oils as well as viscous and fibrous greases. Mounted on a truck with 12″ rear wheels and swivel front casters. Easily pushed from job to job.

MODEL 1017 (shown at left) is one of several models of KLEENSEAL Grease Guns. All models of this type provide a fast, clean method of lubricating machinery equipped with KLEENSEAL, Zerk or hydraulic fittings. MODEL 1017 has 14-oz. capacity. Maximum pressure—5,000 lbs. . . . Models are also available in 3 . . . 5 . . . 9 and 18-oz. capacity.

LEVER-TYPE GUNS are available in both high pressure and volume types, with attachments for all types of fittings. MODEL 1061 (illustrated) handles all types of lubricants and develops pressures up to 10,000 lbs. . . . Capacity 18-ozs.

Get ALL the facts. Obtain complete information by consulting your nearest Lincoln Distributor—or write us for Catalog No. 60

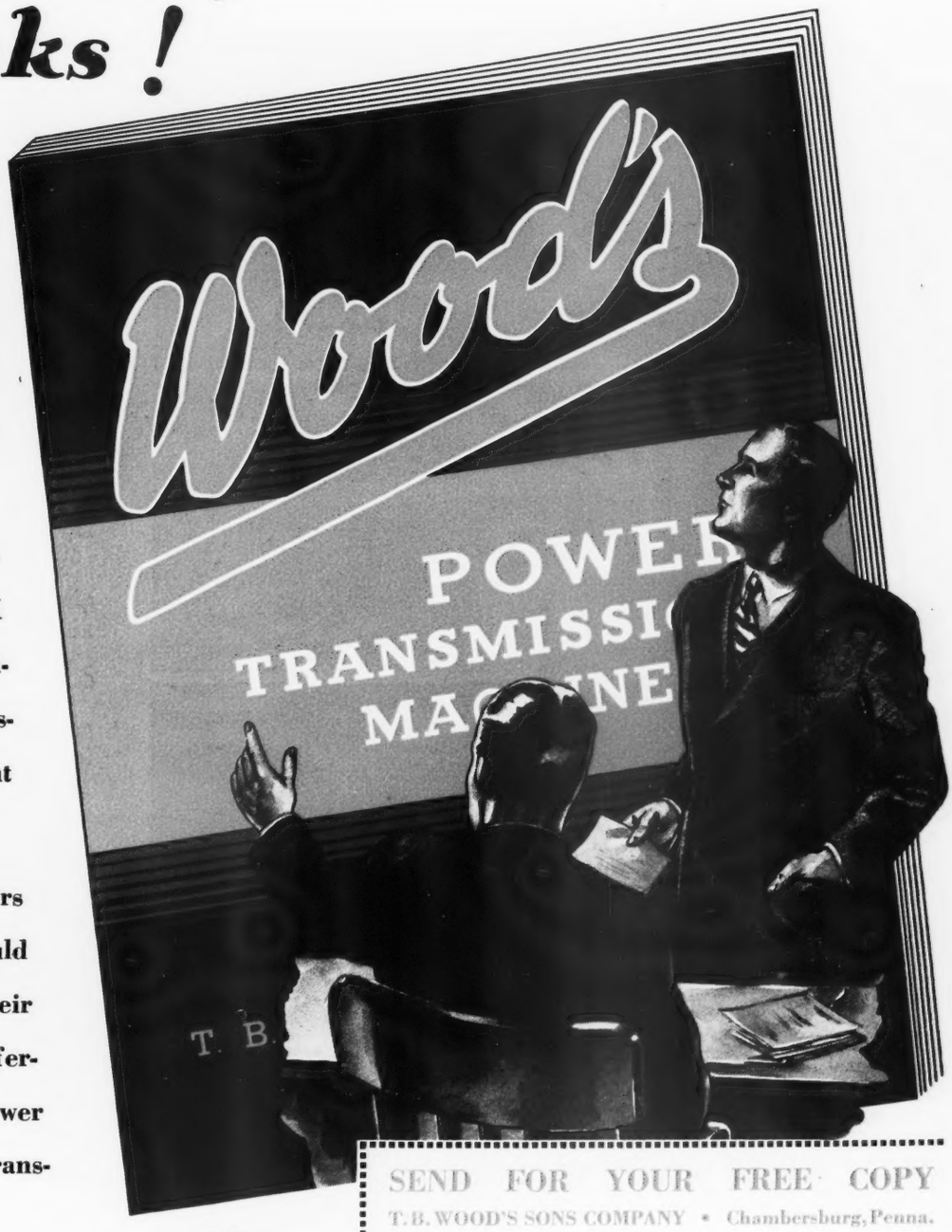
LINCOLN ENGINEERING COMPANY

Pioneer Builders of Engineered Lubricating Equipment

ST. LOUIS, MO., U. S. A.

An Authority Speaks!

● **NEW–WOOD'S CATALOG No. 82 ready for distribution**



The new *Wood's Catalog* No. 82 is packed with facts concerning modern POWER TRANSMISSION MACHINERY.

It is a comprehensive TEXT BOOK —dealing with efficient power transmission equipment and methods.

Engineers and users of machinery should have a copy in their files for ready reference wherever power is mechanically transmitted.

GET YOUR COPY

Ask your dealer for Wood's Catalog No. 82 — or mail the coupon to us.

T. B. WOOD'S SONS COMPANY
Chambersburg, Pennsylvania
BUILDERS OF THE BEST IN POWER TRANSMISSION MACHINERY

Est. 1857

SEND FOR YOUR FREE COPY
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Name .....

Title .....

Company .....

Address .....

F. 11

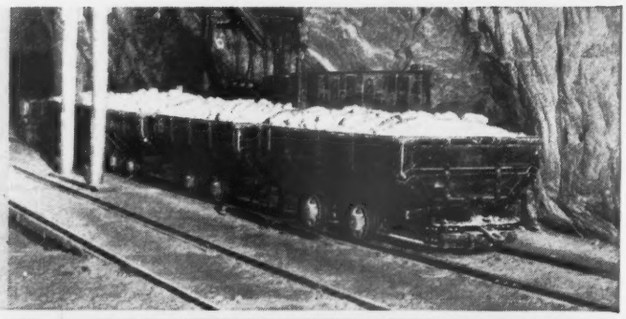
MAIL THIS COUPON!

WIRE ROPE KEPT CORROSION-PROOF

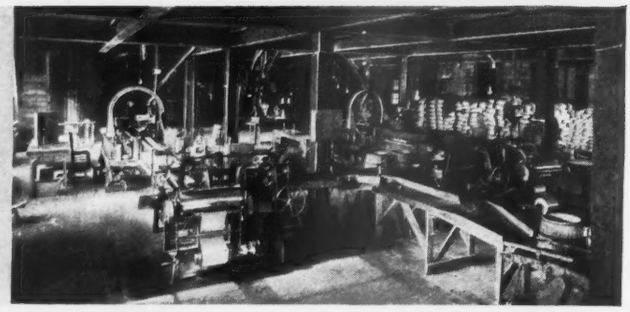
EVEN IN A SALT MINE

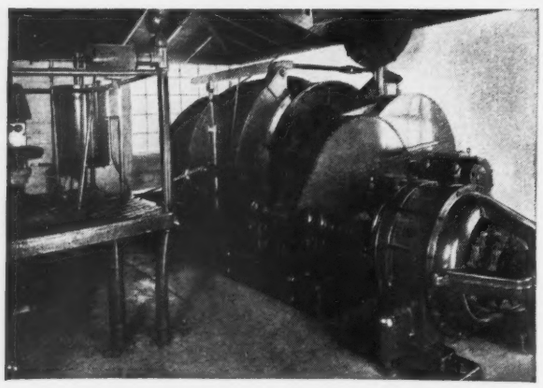
GENERAL VIEW of Carey Salt Co., plant and mine shaft, at Winnfield, Louisiana.

811 FEET BELOW the surface. These mine cars and all other equipment Texaco lubricated 100%. The salt at this depth is considered 99% pure.

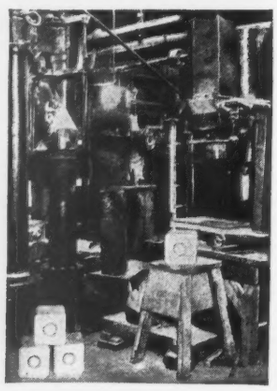


PACKAGING DEPARTMENT where 1-lb. packages are prepared for household use.





HOIST ROOM showing electric motor-driven hoisting drum. All bearings, gears, wire rope are Texaco Lubricated.



One of the hydraulic presses for pressing salt into blocks for stock feeding.

WITH A CAPACITY of 600 tons of refined salt a day, the Carey Salt Co., Winnfield, La. is now mining salt at 811 feet below the surface.

To protect the wire rope against the corrosive action of the salt air, Manager Waters specifies nothing but Texaco Crater Compound.

Texaco Crater Compound coats each wire of each strand, lubricating, preserving, keeping out the corrosive moisture.

Experienced lubrication engineers, trained in the selection and application of Texaco Crater Compound and other Texaco Lubricants, will be glad to demonstrate that savings can be made with Texaco Perfected Lubrication.

For prompt engineering service and deliveries, phone the nearest of our 2279 warehouses in the U. S., or write:

The Texas Company, 135 E. 42nd St., New York, N. Y.

•

Texaco Dealers invite you to tune in The Texaco Star Theatre—a full hour of all-star entertainment — Every Wednesday Night — Columbia Network — 9:00 E.S.T., 8:00 C.S.T., 7:00 M.S.T., 6:00 P.S.T.

TEXACO
REG. T. M.

TEXACO Crater Compound

Single Pillow Block

Double Pillow Block

Heavy Duty Pillow Block with Extra Seals

Countershaft Box

Double Hanger Box

Knee Type Fan Box

Pedestal Type Fan Box

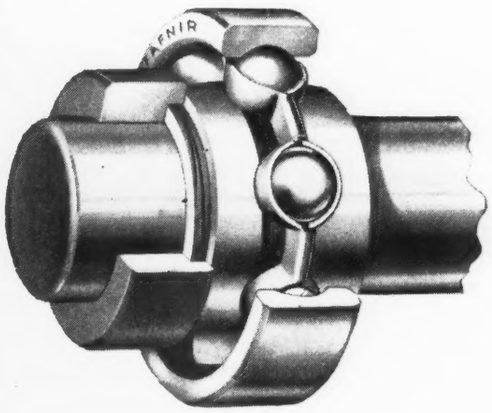
Motor Cartridge

Flange Cartridge

Cylindrical Cartridge

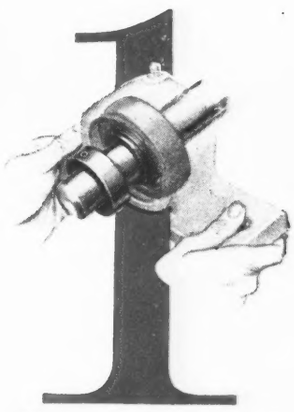
UNMATCHED

FOR EASE OF INSTALLATION

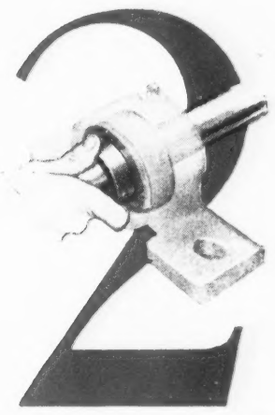


FAFNIR'S COMPLETE LINE OF TRANSMISSION UNITS

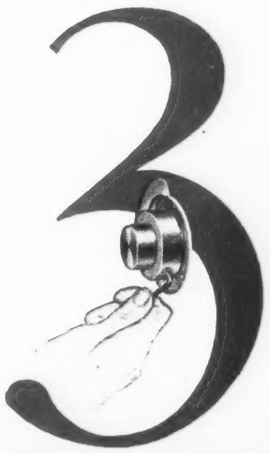
Not just a single specialty, but a complete line of Transmission Unit types and sizes embodies the Fafnir easy-installation principle . . . the Wide Inner Ring Ball Bearing with exclusive Self-Locking Collar. Choose the unit exactly suited to your requirements, and count on the easy application, minimum maintenance and maximum service characteristics of Fafnir Wide Inner Ring Bearings. Your Fafnir distributor can supply the complete range. The Fafnir Bearing Co., New Britain, Conn.



Slip the shaft through the bearing unit, which is bored to inch, not metric dimensions.



Engage the collar with a finger-twist—inner ring locked on shaft.

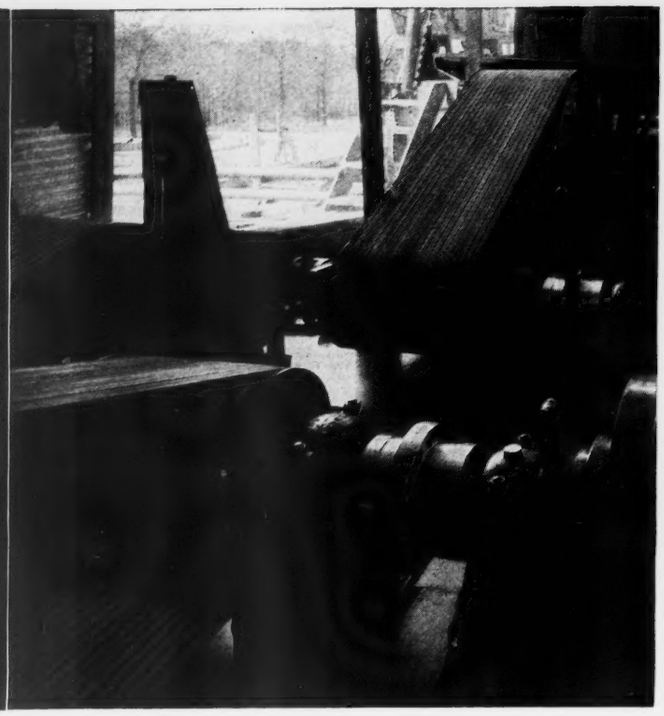


Set the screw, to hold collar in locked position.

FAFNIR *Ball Bearings*

THE BALANCED LINE • MOST COMPLETE IN AMERICA

THERE ARE *60 years* OF Power Transmission Experience Built Into Medart V-Drives



They Are Important Years to the V-Belt Buyer

...because an efficiently engineered drive is a proper combination of various transmission factors... sheaves, shafts, bearing assemblies... as well as belts. When you call in a Medart Representative to discuss V-Drive application, he analyzes your transmission layout in its entirety and makes his recommendations accordingly. It is important to you that Medart V-Drive installations deliver consistently good results for all users because their design and application is the result of 60 years experience devoted exclusively to power transmission problems.

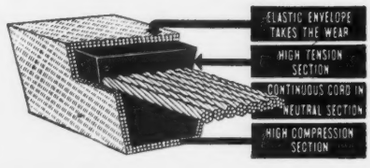
MEDART ENGINEERS in the Medart plant and in the field, spend *all of their time* on power transmission problems. That's why you can receive their services when you need them and can rely on the recommendations they make.

MEDART DISTRIBUTION is nation-wide and enables you to purchase all of your power transmission equipment, including V-Drives, from a single source with one responsibility for efficient operation.

The Medart Catalog is a valuable daily reference guide. Write for yours today.

MEDART V-BELTS

Medart V-Belts have a long flexible life. A belt may "feel flexible," but it is not a success unless it has long life. The belt must be a balance between groove-gripping action, tensile strength, wrapper life and cool running characteristics. Medart Groove-Grippers have this balance of characteristics.



THE MEDART COMPANY

3512 DeKALB ST. **ST. LOUIS, MO.**

For "Power-Travel" at Reduced Rates

MEDART

OIL CONSUMPTION REDUCED 56%
...AN 80% SAVING IN OIL COSTS

● WHEN StanoCyl was tested on the engine in the foreground, a pint lasted 5 hours and 20 minutes; a pint of the oil formerly used lasted only 2 hours and 30 minutes. Naturally it wasn't long before every unit in this plant was put on StanoCyl.

A 50% reduction in oil consumption is not unusual where StanoCyl Cylinder Oil takes over a plant. Even when it replaces lower priced oils, there is usually a substantial saving in actual oil costs, not to mention the improved lubrication and lower maintenance that is bound to follow. In this Kansas power plant, the test was made against a high-grade, higher priced oil. Actual oil costs were cut 80%.

Regardless of what you now pay for steam cylinder oil, try StanoCyl. Find out if you *are* getting the lowest possible costs, including engine maintenance. A Standard Lubrication Engineer will help you make the test. If you are in the 13 Midwestern States served by these Engineers, call the nearest Standard Oil (Indiana) office or mail the card below.

Copr. 1939, Standard Oil Co. (Ind.)

STANOCYL
STEAM CYLINDER OIL

50 FIRST IN SERVICE FOR FIFTY YEARS STANDARD OIL (Ind.)

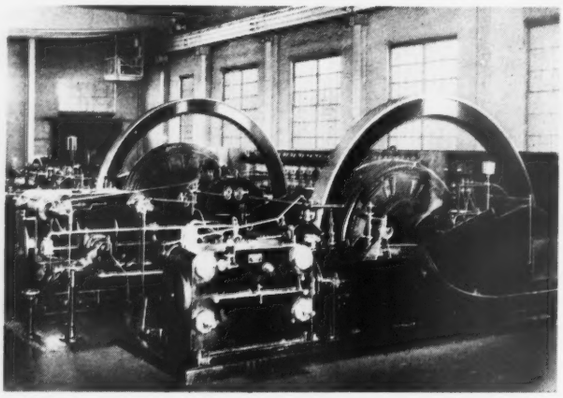
ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEE

ION ENGINEERING••LUBRICATION ENGINEERING••LUBRICATION ENGINEERI

80% LOWER CYLINDER OIL COSTS . . . .

A 50% reduction in oil consumption is not unusual where StanoCyl Cylinder Oil takes over a plant. Even when it replaces lower priced oils, there is usually a substantial saving in actual oil costs, not to mention the improved lubrication and lower maintenance that is bound to follow.

In this instance, the test was made against a high-grade, higher priced oil in a Kansas Power Plant. Actual oil costs were cut 80%.



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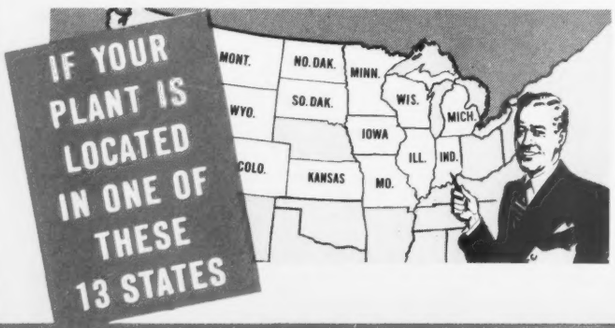
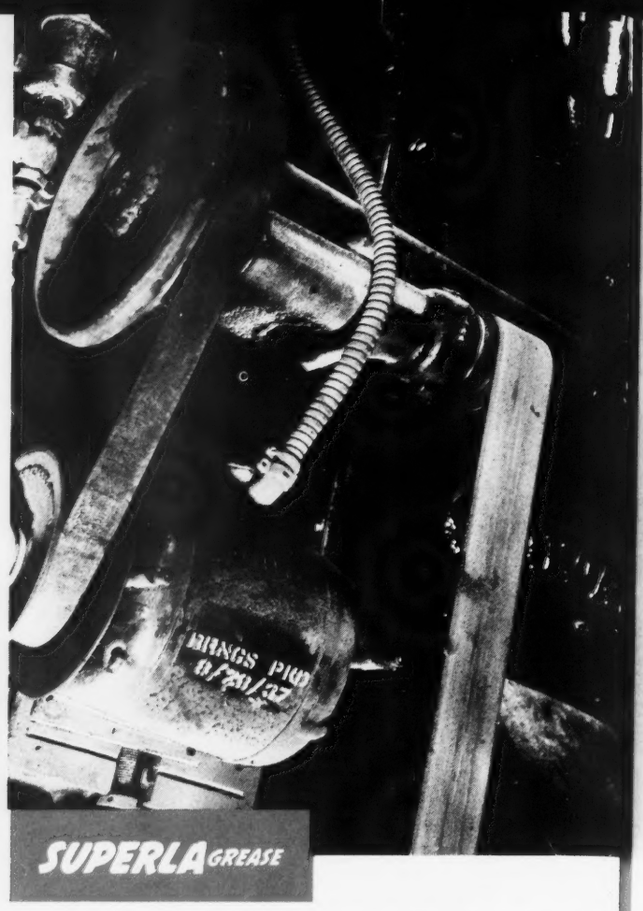




Dusty plant conditions and severe overloads made motor-bearing maintenance a costly item in a Wisconsin plant. In spite of frequent greasing the bearings were replaced on one motor every three months. The stoker motor above was greased daily.

But that's ancient history now. A Standard Lubrication Engineer tested various grades of Superla Grease in these motors. Superla Grease No. 60 was adopted. That was over two years ago, and not one motor bearing has failed.

As an extra precaution some of the motor bearings are cleaned and repacked every 6 months. On many installations Superla greased motor bearings have required no attention other than inspection in over two years.

SEND THE POST CARD FOR . . . FREE LUBRICATION INFORMATION

Brush up on your knowledge of equipment maintenance and lubrication. The Engineering Bulletins listed on the post card at left describe various types of plant equipment, and outline the usual operating problems, and suggest lubricating practices that will reduce maintenance and operating costs.

Check the items that interest you and mail the post card if you are located in one of the 13 states shown on the map.

Don't Forget . . . . .

PROFITS

CAN BE INCREASED THROUGH

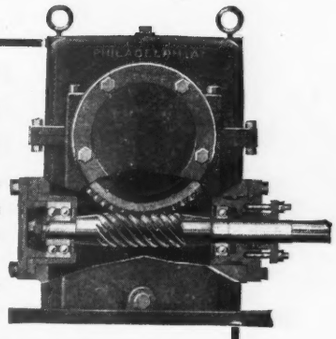
OPERATING ECONOMIES

Savings in operation costs bring added profits just the same as increased sales. This undeniable factor is motivating more and more industrial plants to install

PHILADELPHIA SPEED REDUCING UNITS

for transmitting power from prime mover to driven equipment. They can be supplied in any desired type to best meet your particular requirements. Philadelphia units are highly efficient in operation, extremely dependable, easy to take care of, and will give years and years of good hard service. Write and tell us your problem . . . let us give you unbiased advice as to the best unit for your purpose.

Philadelphia Worm Gear Speed Reducers



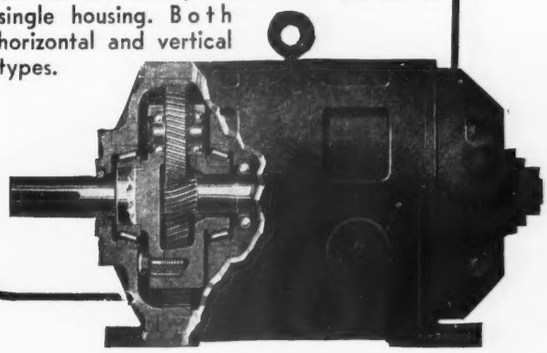
An economical reducer for use where right angle drive is required. Supplied in vertical and horizontal types—in ratios and horsepowers to meet almost every specific condition.

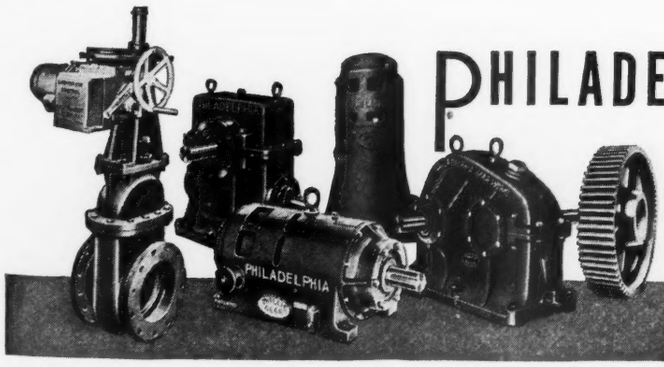
Philadelphia Herringbone Gear Speed Reducers

The ideal drives for transmitting heavy loads at high speeds. Single, double and triple reduction units available. Ratios 1.75 to 1 up to 320 to 1.

Philadelphia MOTOREDUCER

The compact, efficient and highly economical unitized drive, motor and reducer in single housing. Both horizontal and vertical types.





PHILADELPHIA *Speed Reducers*

PHILADELPHIA GEAR WORKS

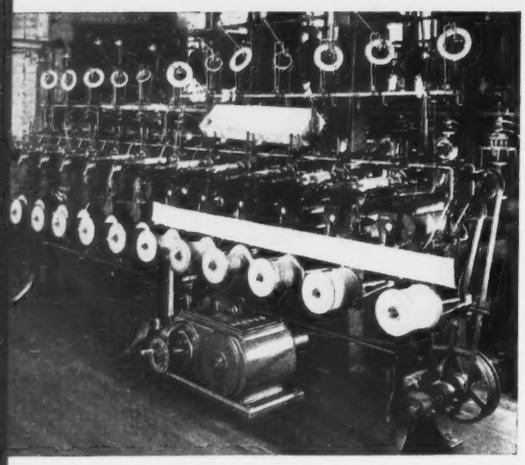
Erie Avenue and G Street, Philadelphia, Pa.

NEW YORK • PITTSBURGH • CHICAGO

INDUSTRIAL GEARS • SPEED REDUCERS • MOTOREDUCERS • LIMITORQUE CONTROL

SPEED UP YOUR PRODUCTION

this quick, inexpensive way

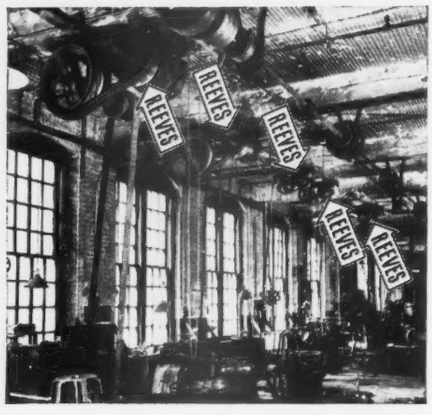


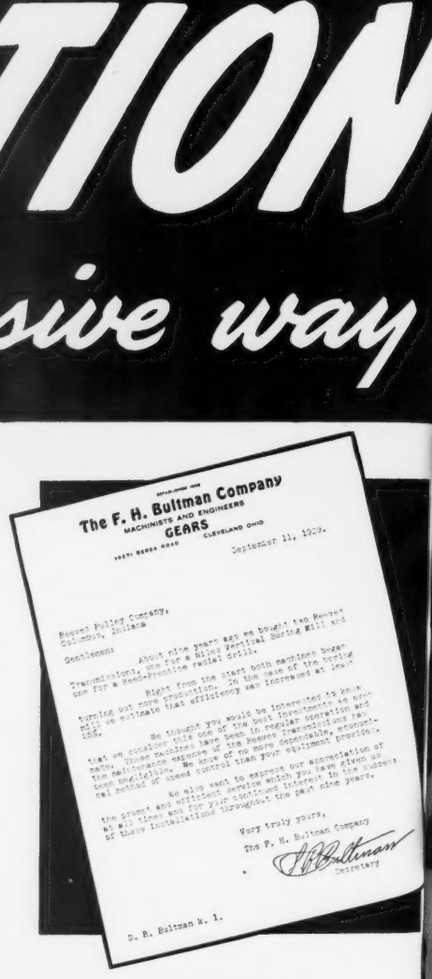
PAPER CORD OUTPUT INCREASED 66⅔%

A Detroit plant has increased production 66⅔ per cent by installing a REEVES Motodrive to vary speeds of spindle rewinders used in the manufacture of paper cord and rope. Because tensile strength of product increases with diameter, larger diameters may be wound faster than small diameters. Original equipment for this purpose was step-cone pulleys which had to be changed each time different speeds were needed. With the REEVES Motodrive, desired winding speed is secured instantly and accurately by turning a handwheel and without stopping the machine.

20% STEP-UP IN COILED SPRINGS

A manufacturer of coil springs has stepped up production more than 20 per cent by installing REEVES Motor Pulleys on spring coilers and torsion machines. For example: on their largest coiler, the highest hourly output formerly attained for a certain type of stainless steel spring of 62 gauge was around 2500. With REEVES Speed Control, they produced better than 3000 an hour because the coiler was run at the most *efficient* speed for this gauge of stock. On a tandem machine, output of a small spring for vacuum cleaner use, was jumped to 5200 an hour where before 4500 was the best they could do. Results are immediate and continuous when REEVES Speed Control is installed on any production machine.





The F. H. Bultman Company
MACHINISTS AND ENGINEERS
GEARS
CLEVELAND OHIO

September 11, 1929.

Reeves Pulley Company,
Columbus, Indiana

Gentlemen:

Approximately one year ago we bought two Reeves Variable Speed Motor Pulleys for a Sigma Vertical Boring Mill and one for a Sigma Precision Radial Drill.

Right from the start both machines began turning out more production. In the case of the boring mill we estimate that efficiency was increased at least 25%.

We thought you would be interested to know that on our machines two of the most important operations are the milling machines and the boring machines. We have been in regular service with these machines for more than seven years and have been satisfied that the Reeves Variable Speed Motor Pulley is the most economical method of speed control that we have ever used.

As a result we have increased our production of these machines more than 50% during the past nine years.

We also want to express our appreciation of the prompt and efficient service which you have given us at all times and for your continued interest in the success of these installations throughout the past nine years.

Very truly yours,
The F. H. Bultman Company
Secretary

G. H. Bultman K. I.

25% INCREASE IN BORING MILL EFFICIENC

Note in the letter reproduced above that t customer not only stresses the increased p duction obtained with REEVES Transmissio but also the *dependability and economy operation* of these units. Observe, too, t REEVES interest doesn't stop with the sa but is continued in efficient service and co eration. Only REEVES has a nation-wide ganization of Speed Control specialists str gically located and at your service at all tim

THE 3 BASIC UNITS IN REEVES LINE

Reeves Variable Speed Transmission

Provides infinite speed adjustability over wide range and for heavy duty service. Accurate and positive at all speeds. Modern open and enclosed designs, vertical, horizontal. Thirteen sizes—fractional to 75 h. p. Speed variations 2:1 to 16:1 inclusive.

Reeves Vari-Speed Motor Pulley

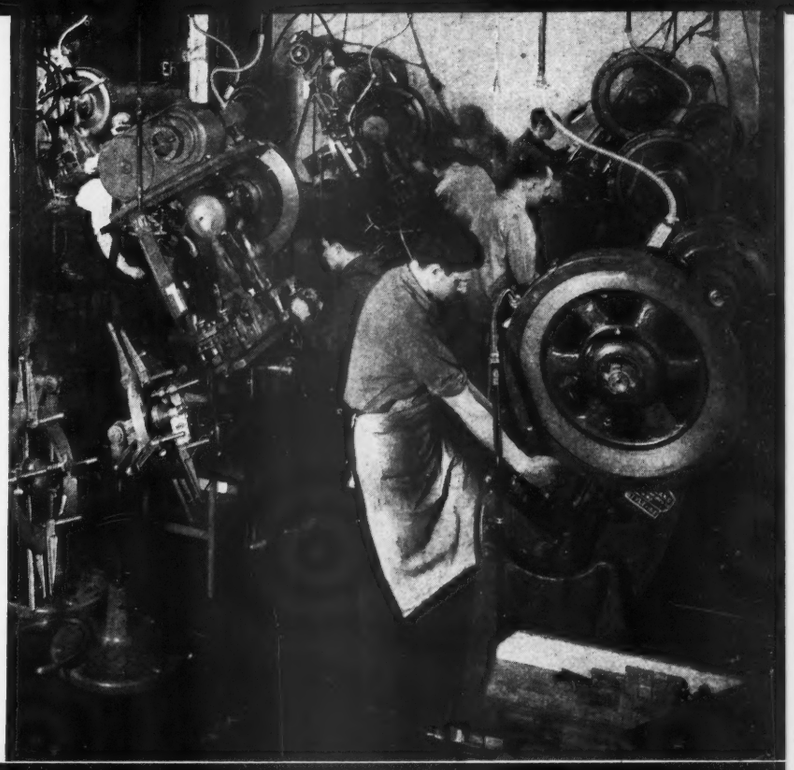
Simplified development of Transmission. Mounts on standard shaft of any constant speed motor. Forms direct drive to machine. For light horse power requirements up to and including 15 h. p. and not greater than 3:1 ratio of speed range.

Reeves Vari-Speed Motodrive

Combines in one compact, self-contained enclosure, constant speed motor, REEVES speed varying mechanism and reduction gears (where required.) In space-saving horizontal and vertical types—¼ to 10 h. p. Speed variations 2:1 to 6:1 inclusive.

8% TO 55% PRODUCTION INCREASE SECURED FROM PUNCH PRESSES

a mid-western plant a battery of punch presses and 4-slide chines form over a hundred million metal parts annually in different shapes and sizes. One day a machine operates so making parts so small that they are removed by air blast. xt day the same machine forms parts several times as large of a different metal of a different width and thickness. duction schedules may call for a dozen changes of product a single day. The flexibility necessary to handle this work at timum speed has been secured by equipping key machines h REEVES Speed Control units. Ease of speed changes, in- e number of speeds available, and the accurate and positive ed settings provided by REEVES units have effected impor- production increases and substantial savings. For example: punch presses, production increases, ranging from 28% to were secured and high quality still maintained by speeding e presses through REEVES Motodrives. On each REEVES- pped 4-slide machine, there has been an increase of 3,000 s an hour, equivalent to 24,000 more units per 8-hour day, representing a step-up of $10 a day in the earning power ch machine.



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Reeves *Accurate • Positive* SPEED CONTROL

EEVES UNITS ARE OMPACT, ADAPTABLE ND EASY TO INSTALL

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e is one way to make sure that the speed control you select our machines will give you the results you want. Consult EEVES representative in your city or state (a factory- ed speed control engineer), or write direct to this company efinite recommendations. Our long experience in provid- ccurate and positive speed control for more than 100,000 trial machines in 18,000 plants, plus the wide range of control units, models, sizes and controls available, insure mplete satisfaction, low installation and operating costs ng service which mean infinite savings and better profits.

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How much has your plant invested in mechanical power transmission equipment? How much does power transmission cost you annually? This handbook brings you usable, definite information on every phase of the proper selection and efficient use of power transmission equipment—Offers facts you require to cut your power transmission costs and to secure maximum service.

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WILLIAM STANIAR
Mechanical Power Engineer,
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The recommendations given in this book for the selection, use and installation of transmission appurtenances are based on the author's twenty years' experience in this field of engineering. The book tells the superintendent, plant engineer, designer, millwright and mechanic exactly what they want to know when confronted with everyday problems of transmitting power mechanically. It covers latest developments in this field—including all methods—and explains how, when and where to use them so that economy of operation and efficient transmission result.

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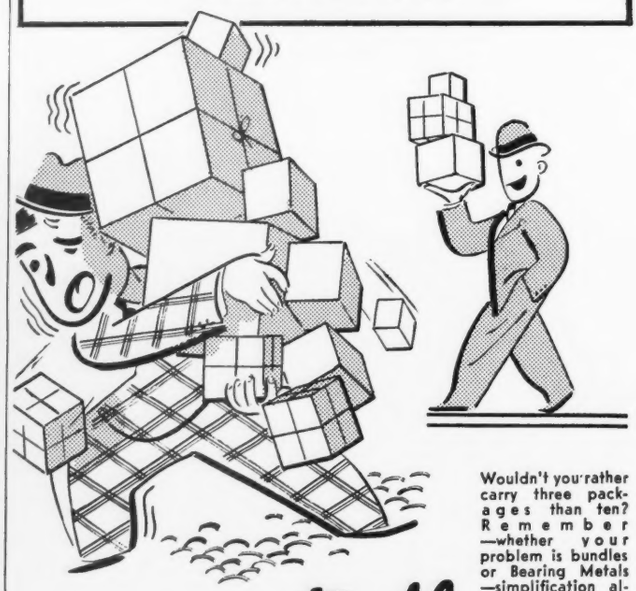

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meet most bearing metal requirements

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For extreme speed and pressure conditions

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For low speed and pressure conditions

Eagle *Controlled Specifications* minimize Bearing Metal Failures

First, because Eagle Bearing Metals are made only of clean, primary metals.

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Mechanical Power Transmission

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1 **Adjustable V-Belting**—New folder giving complete description of the application possibilities of the "Veelos" belt. Describes time-saving features of this type of belt as well as giving complete engineering data for properly belting and installing any drives. Covers both standard and Neoprene construction. **Manheim Mfg. and Belting Co.**

2 **Ball and Roller Bearing Lubrication**—Comprehensive 46-page booklet describing all the many factors involved in the proper lubrication of anti-friction bearings. Well illustrated and tells of tests necessary to determine proper lubricants as well as showing many details of bearing construction as related to lubrication problems. **The Texas Co.**

3 **Ball Bearings for Industrial Replacement**—A new 40-page booklet which tells the story of the development of the Fafnir Wide Inner Ring Bearing units from the user's angle, and exactly what can be expected from them in the way of definite advantages over existing equipment of this nature. The story is complete, but told in simple and interesting fashion to make for easy reading. **The Fafnir Bearing Company.**

4 **Bearing Metal Hand Book**—A 96-page book containing useful information about anti-friction metals, practical instructions for the making and operation of lined bearings for efficient and economical service. The working information, formulae and instruction data will prove useful to every plant operating man. **Magnolia Metal Co.**

5 **Chain Drives and Couplings**—Two well-illustrated catalogs S-9 and 75, provide complete information on silent chain, coupling, roller chain and accessories. The last part of each catalog is devoted to engineering data on selection and application of chain drives and couplings. **Morse Chain Co.**

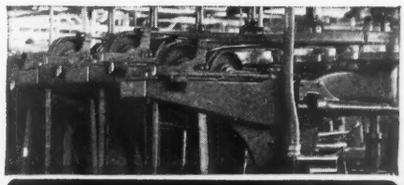
6 **Chains and Sprockets**—Comprehensive 120-page catalog "M" describes a complete line of chains and sprockets for power transmission, conveying, and elevating. Contains more than 30 pages of engineering data for machine designers and maintenance men, gives complete information on speeds, sprockets, ratios, chain tension, idlers, and lubrication, as well as HP diagrams and tabulations covering capacities up to 600 H.P. **Baldwin Duckworth Div. Chain Belt Co.**

7 **Chains and Sprockets**—General catalog No. 617 (96 pages) gives complete data on all types of chains and sprockets for mechanical power transmission; includes also engineering tables on capacities and specifications as well as information on lubrication. **Diamond Chain & Mfg. Co.**

8 **Constant Level Oilers**—Two well illustrated bulletins No. 24 and No. 25 describe a line of automatic constant level oilers for maintaining an accurate level of oil in rings, ball bearings, pumps and gear housings, etc. Shows typical installations and gives list prices. **Trico Fuse Mfg. Co.**

9 **Couplings and Reciprocating Drives**—Data bulletins on couplings for direct-connected machines. Also bulletins on reciprocating drives or shakers for vibrating screens, hoppers and other equipment for close separation and conveying of materials including plastic powder,

(Continued on page 142)



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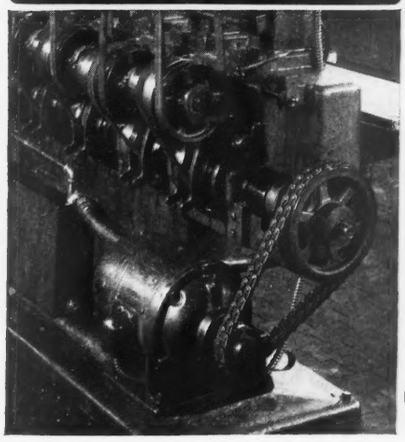

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*60 seconds to uncouple needed length from roll, 60 seconds to couple endless around any drive.

Good distributors all over the country stock Veelos V-Belting. Write for name of one nearest you.

VEELOS The 60-Second V-BELT

MANHEIM MANUFACTURING & BELTING CO., MANHEIM, PA.

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abrasives, grains and feeds, pigments, powdered metals, sand, soda, salt, sulphur, etc. Tells how noise, lubrication and fire hazards are eliminated. **Ajax Flexible Coupling Co.**

10 **High Temperature Lubricant** — Technical Bulletin No. 130C contains valuable information on the use of colloidal-graphited lubricant to solve problems where high temperature is involved. Explains in detail how this product has been developed for high temperature work. **Acheson Colloids Corp.**

11 **"How To Belt Your Drives For More Profit"**—40-page handbook on belting maintenance and installation. Provides transmission data, engineering tables, and belting formulae for leather belting. **E. F. Houghton & Co.**

12 **Leather Belting and Accessories**—A convenient listing leaflet of file size containing brief descriptions of the complete line of belting and belting accessories. **J. E. Rhoads & Sons.**

13 **Lubrication**—Executives, plant managers, superintendents, etc., will be interested in a new booklet on the subject of "How Modern Lubrication Saves You Money." Describes recent developments in the science of lubrication. **Lubriplate Division of Fiske Brothers Refining Co.**

14 **Mechanical Power Transmission**—Handbook 1600. A 272-page book for design engineers and plant managers on mechanical power transmission units —design, application data, dimensions, weights, list prices; self-aligning ball- and roller-bearing units; unmounted radial thrust bearings; friction and jaw clutches; welded-steel base plates. **Link-Belt Co.**

15 **Multiple V-Belt Drives**—28-page catalog, B6029, describing "Texrope" drives for fixed and variable speed applications. Bulletin also describes line of "Lo Maintenance" motors. Well illustrated with photographs and engineering diagrams and complete performance and application data. **Allis-Chalmers Mfg. Co.**

16 **Power Transmission Equipment**—Comprehensive 144-page catalog No. 66 lists a complete line of power transmission equipment and accessories. Well illustrated with photographs and diagrams as well as performance and capacity tables. Contains complete specifications and prices for a large and varied line of power transmission equipment. **Medart Co.**

17 **Roller Bearings**—New catalog No. 15 gives complete listings of Radial Thrust Roller Bearings, both single and double row, and stock mounted units including pillow blocks, flange units, cartridge units, conveyor rolls, etc. Lists many new types and sizes of bearings, including the "DE" Series of self-contained double row roller bearings, and many metric sizes. **Shafer Bearing Corp.**

18 **Silent Chain — Roller Chain** — Catalog V135 (64 pages) gives complete engineering information, dimensions, illustrations of silent chain drives as used in many branches of industry. Roller chain catalog V115B (64 pages) contains complete information on roller chain. These two catalogs provide data on drives from fractional to hundreds of horsepower. **Whitney Chain & Mfg. Co.**

19 **Speed Reducers**—A new 64-page catalog on a complete line of single, double and triple reduction herringbone gear speed reducers. Contains complete details and engineering information. **Philadelphia Gear Works.**

20 **Variable Speed Control**—Catalog G-397, recently revised, with new engineering information, covers a complete line of Variable Speed Control equipment, consisting of the Variable Speed Transmission, Vari-Speed Motor Pulley and Motodrive. **Reeves Pulley Co.**

21 **V-Belt Drives** — 40-page catalog containing new engineering compilation for users and designers of all types of fractional horsepower machinery. Designed to aid in the selection, without calculation, of drives for any power machines and also contains a special engineering section on the laying out of drives for a group of machines. Drive tables, dimensions, and prices are all included. **Dayton Rubber Mfg. Co.**

22 **Lubricating Oil***—Interesting new booklet "Spare the Time To Spare Your Machines" describes the latest development in a highly stable, long lasting oil for many uses. Provides data on many plant lubricating problems. Another new booklet "The Lubrication Engineer—His Value To You" tells how trained lubrication engineers can help plant men reduce lubricating costs in their plants. **Standard Oil Co. (Indiana).**

23 **Cylinder Oil***—New booklet "How StanoCyl Cuts Oil Consumption" is of interest to all power plant men concerned in the purchase or use of steam cylinder oil. Gives performance and application data. **Standard Oil Co. (Indiana).**

* Note: Literature described in these two paragraphs is limited in its distribution to plant men in the following states: Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Kansas, Montana, Wyoming, and Colorado.

(Check numbers on coupon p. 141)

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COLLOIDAL GRAPHITE
SURVIVES FIRE . . .
. . . without losing its lubricating properties even at temperatures of 1800°F and upwards in ceramic and glass making machines; in conveyors and baking ovens, in die casting and permanent mold equipment.
"Dag" outlasts temperatures that burn petroleum oil, thus lubricants can be prepared by dispersing this product in fluids that quickly evaporate at the higher temperatures. Only a positive, clean lubricating film of pure "dag" colloidal graphite is left which becomes affixed to the bearing surfaces. "Dag" makes an ideal teammate for oil, as it takes over the load at the point beyond which plain lubricants fail.
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ACHESON COLLOIDS CORPORATION
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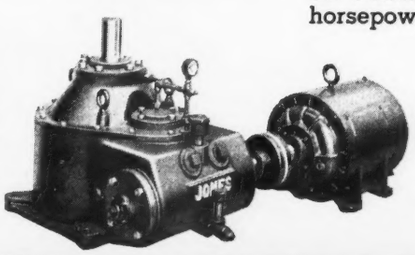
COLLOIDAL PRODUCTS

For driving agitators, mixers and similar equipment—

JONES WORM-HELICAL SPEED REDUCERS

HERE is a line of machines that fills a long felt need for double reduction units of the fully enclosed type to be used for agitators, mixers, etc. requiring a vertical shaft drive.

Many of these Jones units have established excellent performance records in a wide variety of service. As a result of that experience a complete standard line has been developed covering 15 standard ratios ranging from 40 to 1 to 250 to 1 for all common motor speeds and a wide range of horsepower ratings.



• This Jones Worm-Helical Speed Reducer on a lacquer agitator is typical of the wide range of services for which these drives can be used such as ore roasters, pulp tank mixers, furnaces, bending rolls and similar applications.

The new Jones Bulletin No. 75 covers complete details on these new Worm-Helical Speed Reducers, with rating tables, dimension diagrams, torque charts and other application information. We shall be pleased to send you a copy.

W. A. JONES FOUNDRY & MACHINE CO.

4433 Roosevelt Road, Chicago, Illinois

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HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • PULLEYS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES • ANTI-FRICTION
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A recent letter from an important plant executive tells how FACTORY is used in his plant:

"The popularity of FACTORY is attested by the fact that it enjoys the largest circulation of any magazine from our private company library (including private subscriptions) from among over 70 technical and business magazines distributed to our executives. Progressive thought, constructive editing, and adequate illustrations are a great aid to any man whose job it is to help run industry's plants or factories".

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MAGNOLIA METALS

MAGNOLIA ANTI-FRICTION METAL

300% Better than Genuine Babbitt . . . . at ½ Cost!

Magnolia Anti-Friction Metal has the lowest coefficient of any known bearing metal. Unequalled for steady high speed and heavy pressures.

For Corliss Engines, Gas Engines, Compressors, Motors above 10 H.P. and all transmissions. Keeps shafts in good condition—lowers your operating costs.

Full details and literature upon request.

MAGNOLIA METAL COMPANY
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When you install **SKF** Transmission Appliances, you protect your machines and their bearings with savings up to 35% in power, 80% in lubrication, and new lows in maintenance costs.

Look over a few of **SKF**'s many types of transmission appliances shown on this page. There's an **SKF** for your every bearing need, designed for performance . . . and PROFITS . . . on shafts from 5/8" to 30" in diameter.

See your nearest **SKF** distributor for types, sizes, prices, etc. **SKF** Industries, Inc., Front St. and Erie Ave., Phila., Pa.

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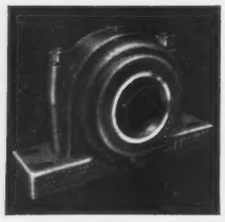

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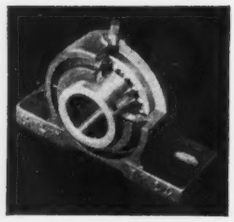

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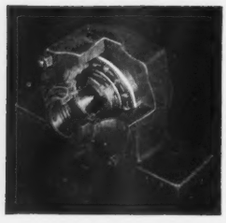

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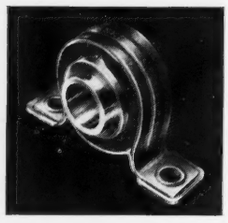

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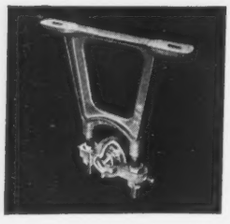

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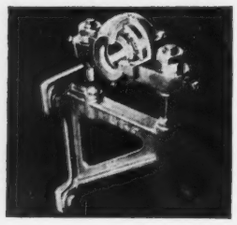

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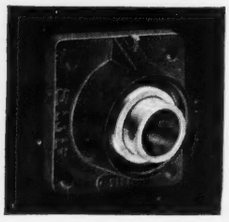


Advertisements for this section continued on page 304

Electrical Transmission and Utilization

in the cost-reducing program

THIS YEAR the manufacturing industries will consume at least 50,000,000,000 kilowatt-hours of electrical energy.

The bill for this energy will be in excess of $600,000,000. This is a tremendous amount of money in any language. It is as much as industry spends for its new plant buildings in a good year.

If all of it were spent for 100 per cent efficiency in electrical transmission and application, well and good.

But it isn't. The ideal in equipment selection and application is seldom attained except by revision after revision—as conditions change, as knowledge increases.

Moreover, continuous improvement goes on in all the electrical equipment lying in the path from substation to application. Research goes on and design is improved year after year in the ever-changing electrical equipment industry.

Improved equipment plus better selection plus better utilization equals higher efficiency. As efficiency goes up, that tremendous electrical bill now being paid by industry will go down.

More of the $600,000,000 will go into profits. And more of it will go toward turning out products at lower costs which will result in more goods at lower prices for more people.

WHAT TO DO

SUGGESTIONS THAT POINT THE WAY

Calculate transformer losses to determine the advisability of rebuilding or replacing.

Consider distribution system from standpoint of flexibility, adequacy for the load carried, voltage drop, condition of insulation.

Check switching and protective devices for condition and adequacy.

Consider advisability of correcting power factor, to increase carrying capacity, reduce line losses, improve voltage conditions.

Study all power applications to determine condition and most suitable type and size of motor to use.

Examine all control equipment to determine condition and advisability of replacing with later or more suitable types.

Investigate the advantages of more extensive use of meters and instruments for properly allocating power costs, checking machine operation, determining and maintaining optimum machine loads.

Look into the advantages of electric heat, with a view toward its wider application in manufacturing.

See whether demand peaks can be reduced either by staggering operation of equipment, or by automatic or manual limitation.

QUICK WAYS TO PROFITS

ASK YOURSELF THIS QUESTION:

WOULDN'T you like to get definite *extra values* with every dollar you spend on electrical equipment? You do just that when you deal with Graybar.

For instance, you get a solid Graybar guarantee backing up every sale, every item.

You get helpful cooperation from Graybar men experienced for years in meeting just such factory electrical requirements as yours.

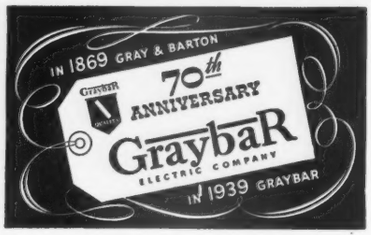
You get the benefit of a nearby, well-stocked Graybar warehouse. You can use it as your *own* stockroom and save the cost of maintaining large reserve electrical supplies.

You get prompt "action service" to save you time when time means money. Including speedy truck delivery that rushes you what you want *when* you want it.

Graybar gives you full value in every product *plus* extra values that go beyond the product. Investigate! Call on Graybar for your next electrical need!

WIRE AND CONDUIT MOTORS

OFFICES IN 83 PRINCIPAL CITIES



LIGHTING WIRING DEVICES SIGNALS

EXECUTIVE OFF., GRAYBAR BLDG., N. Y.

**Spent $500, Saved $20,000

We have a system of conveyor belts capable of handling 700 tons of crushed ore per hour. Before installing the interlocking control system now in operation, clogging of a hopper or stopping of one of the head conveyors for any reason often caused a spill of large proportions before the operator could shut down the conveyors that were still feeding.

Serious belt damage often resulted from these spills, which have now been entirely eliminated.

Motors were installed originally for pushbutton operation by three operators. Now two operators handle the work without any difficulty.

Taps from two legs of the No. 1 conveyor motor were hooked to the holding coil of a magnetic contactor and the contacts connected in series with the stop wire of the pushbutton controlling No. 2 conveyor motor. Now No. 2 conveyor cannot run until No. 1 conveyor starts. If No. 1 motor fails from any cause, the magnetic contactor opens, stopping No. 2 automatically.

Likewise, No. 2 conveyor motor legs are tapped to the holding coil of a second contactor whose contacts are connected in series with the stop wire of the pushbutton for No. 3 conveyor motor.

To complete the hookup, taps from the legs of No. 3 conveyor motor are connected to the holding coil of a third contactor whose contacts are connected in series with the stop wire of a magnetic switch which stops all conveyor feeders, thus making the whole handling system automatic.

Belt conveyor No. 1 is 700 feet long; No. 2 is 735 feet; and No. 3, 650 feet long. These belts are all of five-ply construction, 36 inches wide, and cost approximately $6 per foot. Replacement of any one of these three belts is therefore a major expenditure.

Labor and material cost of installing the conveyor control added up to just about $500.

Estimated savings are in excess of $20,000 a year. This figure is based on the cost of cleaning up spills, repairing or replacing damaged conveyor belts, and resultant loss of production occasioned by unexpected stoppage of conveyor motors, as shown by our company's previous experience.—*Harvey D. Stewart*, Electrician, Climax Molybdenum Company, Climax, Colo.

Increases Production with Interlocking Controls

Replacement of manually-operated controls with the magnetic type, supplemented by limit switches and other devices, has made big savings for a well-known plant.

Processes conducted in this plant involve the handling of large quantities of bulk material by conveyors and other means. Continuous operation requires that materials flow in the proper volume and without interruption from one production machine or manufacturing process to another.

Some interruptions due to breakdowns or other causes are practically inevitable. Even with intelligent, alert operators it was impossible when manual control was used to shut down key conveyors and machines quickly enough to prevent clogging of equipment and heavy spillage or overflows. Besides disrupting production these mishaps caused considerable wastage of material and incurred heavy labor costs for cleaning up.

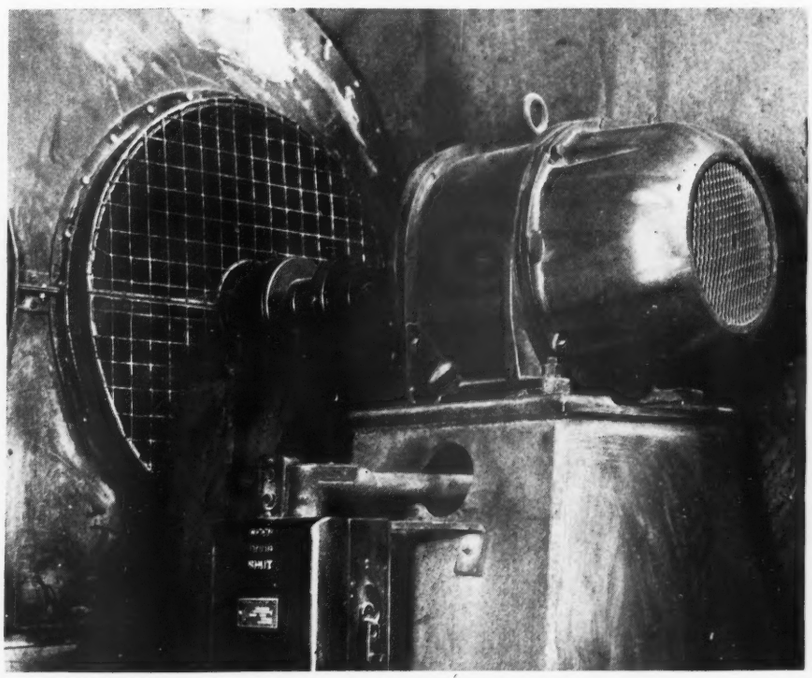
Controls are now interlocked and with the aid of suitable auxiliary devices control of the operation of equipment has been made as nearly automatic as possible. Numerous pushbutton stations, conveniently located, provide additional safeguards by making it possible for operators to stop

Circuit Breakers Cut Loss of Machine Time

In one department of a large paper mill there was an average of three or four motor outages every day. Each such occasion resulted in about 15 minutes loss of time for three operators and three machines. Cost of man-hours lost alone totaled $1.35 per day in addition to the idle machine time.

Installation of a suitable circuit breaker to protect the motors resulted in reduction of lost time per day to a practically negligible total of 5 minutes, without any maintenance cost.

INCLOSED MOTORS LOWER MAINTENANCE 75%

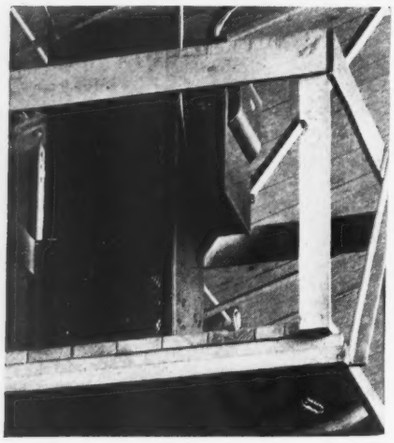


A company that manufactures glassware made an analysis of its motor and control performance, and found that motor maintenance costs were averaging better than $2,400 a year. It was also found that these high costs resulted principally from the fact that motors were placed close to molding machines where they were subjected to hot oil fumes. Also, bearings on motors located near batch mixers seldom lasted more than a year. Installation of modern fan-cooled, totally inclosed motors in place of those formerly in use, was followed by a 75 per cent reduction in maintenance expense—an annual saving of $1,800

conveyors and machines immediately when something goes wrong.

The result of this modernization program has been a great reduction in repair and maintenance costs and clean-up labor, with a marked increase in the continuity of production.

PAY OUT IN 2 YEARS



A plant in the Middle West was enabled to reduce its power bills and increase the capacity of the power circuits by installing a 120-kva. bank of capacitors. The power bill was reduced approximately 20 per cent by a reduction in the net monthly demand. The capacitors were purchased by the local power company, and the plant is paying for them by the difference in its monthly power bills. On this basis they will be entirely paid for in slightly less than two years

New Motors and Controls Save Cost in a Year

A milling company wanted to make operation of its plant more efficient and safer by eliminating as many as possible of the hazards and troubles that had been bothersome.

Following a thorough study of the different problems, needs, and conditions, totally inclosed motors were installed in all places where dust creates a hazard. Suitably protected controls were put in. Many of these controls are interlocked to regulate the sequence of operation and automatically stop certain motors if other motors fail. This was done, of course, to prevent clogging of equipment when failure occurs somewhere along the line.

Savings brought about by the new equipment during the first year of operation were estimated at about $5,000. This sum covers the entire cost of the new installation.

Here's Stop-Motion Control

One of New England's largest thread manufacturers increased the efficiency of operation of winders by providing phototube controls to detect breaks in the threads.

Approximately 100 bobbins feed to a common loom where 100 separate skeins are wound. Formerly the thread winder, measuring thread from bobbins, continued operating despite one or more thread breaks, until a predetermined number of revolutions of the loom were completed. If the thread broke on any one skein, that thread would have to be salvaged because its length would be unknown. In some instances a careless operator would assume that all of the skeins were full and some customer would receive a short-length skein.

Stop-motion control has been inexpensively introduced on this machine with the help of a phototube. Individual targets are hung from each thread and lined up in a simple fixture just above a beam of light. When a thread breaks this target drops, cutting the light beam which operates the phototube control and stops the winder motor. After the operator mends the break the winder is again started on its cycle.

Graphic Ammeter Assures Proper Mixing

In mixing facing sand for molds, it is important, first, that the sand in its dry state be well mixed in the muller; second, that water is added at the right time; third, that water and sand are mixed for a definite length of time. It is not easy to determine simply by examination whether the sand has been correctly mixed or not. Thus a poor mix may not show up until after the molds have been made and baked.

To prevent such losses a steel castings manufacturer in the Middle West has installed a graphic ammeter in the motor circuit of the sand muller. The motor is 20 horsepower, 220 volt, 3 phase, 60 cycle, and the meters used in connection with a 100/5-amp. current transformer.

The graphic chart tells the story. The main purpose, of course, is to provide a check on whether the operator is watching his timing properly, adding the water at the right time, and then mixing the sand wet for the required three minutes.

With Wattmeter, Choice of Motor Is No Guess

An experienced engineer can usually make a pretty good guess as to the amount of power required to drive a lineshaft or certain kinds of machines. At best, however, it is only a guess, whose accuracy is likely to be seriously affected by unforeseen conditions.

In one large plant there is no guesswork in selecting the proper size and type of motor for any application. The necessary facts are obtained by the use of an outfit consisting of a 20-hp. motor and recording wattmeter, mounted so that they can be moved from place to place.

When motors are to be selected for either individual or lineshaft drive, the portable motor is connected up and used to drive the equipment until the size and characteristics of the load have been determined. With the information recorded in the charts it is a simple matter to select the exact size of motor required.

✦

From an expenditure of only $200 for circuit breakers, an Eastern concern saves more than $300 yearly in idle time.

✦

Saves $2,900 Yearly With Capacitors

A Mid-West manufacturer of heavy industrial equipment buys power under a contract that provides a penalty of 0.011 cent per kilowatt-hour for each per cent of power factor below 80 per cent. All the motors on the machine tools are the squirrel-cage induction type, except one small synchronous motor. The average power factor was 67 per cent.

A 240-kva. capacitor raised the power factor of the company's electrical system to 80 per cent. The following figures show the saving effected:

Penalty avoided per year	$3,589.92
Interest on investment ($3,696) plus depreciation per year	554.40
Cost of operating capacitor per year	145.15
Total charges per year	699.55
Net return per year	$2,890.37

NO BURNOUT WHEN THE PUMP STALLS

A vertical pump motor used in a large paper mill to circulate material through the sump was frequently stalled due to overload. Occasionally workmen would block the breaker and try to force the impeller with a large wrench, in order to clear the pump. The result was a burned-out motor, entailing a cost of about $190 for repairs, on each occasion. Installation of a tamper-proof combination linestarter and circuit breaker stopped all trouble of this nature and eliminated the incidental maintenance expense

$3,000 for Electrical Equipment Saves $6,000

Facing the need for more power, an Eastern plant was prepared to spend $12,000 for a new generator and switching equipment. Before orders were placed, however, a careful investigation showed that the old generating equipment would carry the extra load if the power factor of the plant circuits were raised and certain changes made in the switchgear, at a cost of about $3,000.

The necessary changes were made at a saving of $9,000 over the cost of the original plan. Operating economies brought about by the new conditions amount to $6,000 annually, representing a 200 per cent return on the investment.

No Failure, Saves $1,800

Insulation resistance meter readings on one of the large generators that supply power for a glass plant showed a serious drop in value. Careful examination revealed the existence of conditions that would have resulted in a failure which would have cost at least $4,000, incuding loss of time and material.

With this warning of impending failure, suitable arrangements could be made to take the generator out of service and make the necessary repairs at a cost of approximately $2,200.

Savings were at least $1,800, according to close estimates.

✦

Four customers of a large power company installed capacitors to improve power factor. Total equipment cost, $4,025. Annual saving, $5,000.

✦

Motor Saves Its Cost

Monthly demand charges in a plant that manufactures crushed steel products were reduced 37.6 per cent by the installation of a 60-hp. induction-start, synchronous-run motor, to replace a 30-hp. induction motor.

When operating with 212.5 horsepower in induction motors alone the load factor was low and the power factor was 46 per cent. For one typical month the demand was 100 kilovolt-amperes, which gave a demand charge of $153.75.

After installation of the new motor the billed demand dropped to 58 kilovolt-amperes, entailing a charge of $96. So there was a saving of $57.75. In addition, by setting the brushes of the motor for maximum corrective

Capacitor Does Three Jobs

Capacity of a plant manufacturing cast-iron, brass, and copper pipe fittings had to be increased, which meant adding considerable load to the electrical system. By installing capacitors and thus increasing the amount of current that could be carried, it became possible to make the anticipated changes without increasing the size of the conductors in the power circuits. Raising the power factor to about 95 per cent produced a saving of approximately $220 a month.

An incidental but important advantage occurred in connection with a feeder in a remote section of the plant, on which the voltage drop had been considerable. With the installation of the capacitors the line drop was reduced to about 4 per cent.

This plant expects a return of 75 per cent on the investment during the first year. It is estimated that the capacitors will pay for themselves, including interest, capital investment, and depreciation in 18 months.

Two of three banks of capacitors which constitute a triple cost-cutting threat

effect, the power factor was raised to 70 per cent.

It cost $1,068 to install the new motor, but with a monthly saving of about $57 this cost will be returned in little more than a year and a half.

Geared Motor-Reducer Speeds Up Flying Shear

Speed of a flying shear used for cutting plates from strip stock was considerably increased and operation simplified by substitution of a geared motor-reducer for the drive formerly employed.

When originally installed, the shear was driven by a belt. To prevent excessive slippage caused by heavy inertia during the starting period it was necessary to tighten the belt while starting, and then slack it off after the shear was up to speed. Slippage and belt adjustment were eliminated by connecting the shaft of the shear directly to the output shaft of the reducer. At the same time speed was increased between 50 and 100 feet per minute.

Inclosed Motors Pay 266%

Abrasive dust in the plant of a manufacturer of metal products caused much trouble with the open-type motors used on certain drives. With about three motor burnouts per month, on the average, repair costs amounted to around $3,000 per year, not including down time of machines while motors were being repaired or changed.

Installation of totally inclosed, fan-cooled motors on the more troublesome applications resulted in the reduction of burnouts to one or two per year. Repair costs likewise dropped to a few hundred dollars. And, of course, loss of production due to motor trouble was correspondingly lowered.

It is estimated that the investment in inclosed motors brings in a return of about 266 per cent.

Meter Saves $2,500

Routine tests with an insulation resistance meter showed that the insulation resistance of a 300-kw. generator had suddenly dropped 70 megohms. When the test was repeated a month later, it was found that there had been a further drop to about 6 megohms insulation resistance.

With this clear indication that something was wrong, a thorough inspection was made which showed that the insulation on one coil was defective. It was replaced at once.

It is estimated that this prompt action in replacing the damaged coil prevented an interruption to service and saved repairs that would have cost $2,500 or thereabouts.

Plug-In Circuit Saves Time

A large New England shoe manufacturer has a plant in which 550-, 220-, and 110-volt services formerly were used. Circuits were badly overloaded. About 75 per cent of the machines were driven in groups, and 25 per cent by individual drive, and it was very expensive to shift machines to suit changes in production.

As part of a plant modernization program the three voltage services were replaced by a single three-phase, four-wire, 220-volt system with outlet boxes spaced approximately 8 feet apart along the walls of the building. From each outlet both three-phase current for motors and single-phase, 110 volts for lighting circuits can be obtained. Thus when it is desired to change an individually driven shoe machine from one place to another, the motor can be quickly disconnected and plugged in again after the machine has been shifted. Instead of requiring several hours and sometimes expensive changes in order to shift machines, they can now be quickly reshuffled to suit new production programs. On one Saturday morning recently a total of sixteen machines were rearranged.

Because of this change in the distribution system and the installation of new individually driven machines, the over-all time required to complete a pair of shoes has been reduced from 17 work days to 12½ days. This period includes, in both cases, 7½ calendar days in which the shoes are left on the lasts to insure that the shape will be retained.

With a plug-in wall circuit, machine and lighting changes can be quickly made

Controls Winder Speed with Phototube

A textile finishing company solved a bothersome problem by developing a simple and satisfactory method, based on the use of two phototubes, for providing speed compensation in winding cloth.

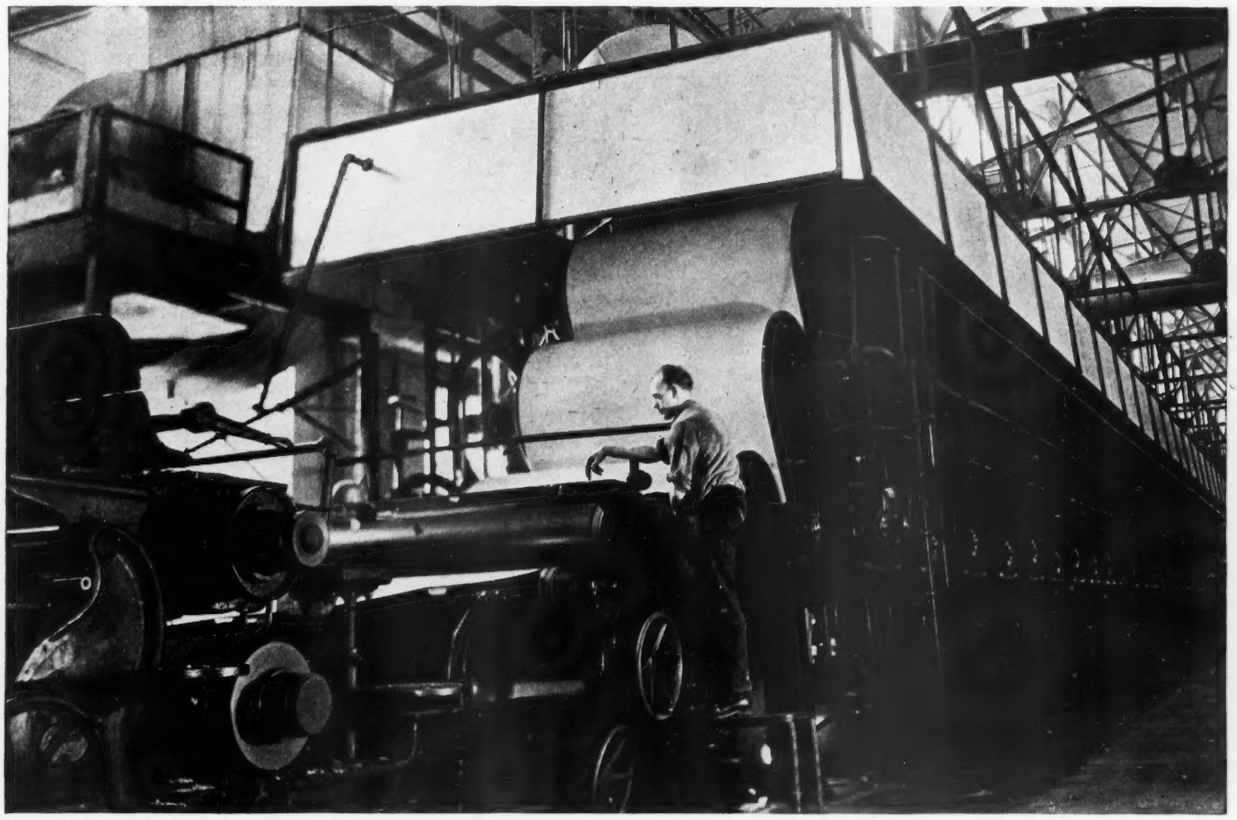
After being pressed, cloth is wound on a large spool which is driven by a d.c. motor. The cloth is looped between two beams in such manner that the loop represents the slack between the cloth in process and the cloth being wound.

The beam of light for actuating one phototube control is projected across

✦

Fuses protecting lathe in aircraft engine plant used to average four blows a week. "Super lag" fuses are now in use, put a stop to all that.

NO BURNOUTS IN 2½ YEARS WITH CIRCUIT BREAKER PROTECTION



When any one of the six motors on the fourdrinier machine of a large paper company failed, the result was a loss of $125 per hour of machine time plus an average cost of $100 for motor repairs. This particular paper company was experiencing about four such failures a year with a total cost of $1,440. To correct this trouble suitable circuit breakers were installed. With this effective overload protection, there has not been a single motor burnout in 2½ years

the loop at a point below which the loop must not fall. A second beam is directed at a phototube placed at a point above which the loop is not to rise. The speed of the d.c. motor normally is such that the winding spool tends to take up all the slack in the cloth.

When the loop of slack cloth rises up and interrupts the upper control beam the phototube automatically shunts a resistance into the motor circuit, slowing it down. The loop then gradually drops until it breaks the beam governing the lower control. This automatically cuts out the added motor resistance, and the cycle is repeated all over again.

A desirable feature of this method of control is that the goods in process do not touch any levers or other control devices. Regulation of slack is accomplished solely through the interruption of light beams.

New Wiring Ups Output 3%

A textile mill had made a good many changes since its buildings were erected, adding new machines and changing others around. In the meantime little was done to the distribution system to enable it to handle the changed load conditions more efficiently.

Increasing trouble with motors and circuits eventually led to a complete survey. It disclosed that all circuits were badly overloaded.

Under these conditions installation of a complete new distribution system was the most satisfactory solution of the problem. It was put in, at a cost of $2,600. The increase in motor speed that followed the great reduction in voltage drop boosted production 3 per cent, and increased profits $4,800.

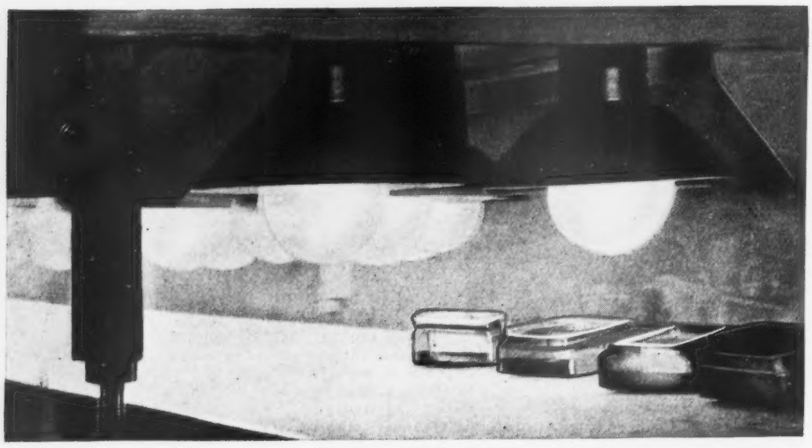
Protects Against Pile-Ups

Installation of a quick-acting control in the circuit of the driving motor eliminated trouble formerly encountered with an automatic punchpress. This press stamps out aluminum parts at the rate of 100 per minute. When operated at this speed there is a tendency for the parts to pile up once in a while, which may result in a broken die or sprung shaft on the press.

The control is bypassed during the starting period, but is put in the circuit as soon as the motor has come up to speed. It is set to operate at a value of current slightly above that normally taken by the motor. So long as the current is below this predetermined value the contactor is held closed and the solenoid-operated trip pin of the press is kept in.

Any increase in motor current, such as will result when two or more stampings pile up, causes the control to release the trip pin and stop the motor.

Construction and operating principle



Parts move on conveyor under bank of drying lamps; finishing cost is 25% less

of the control is such that the action is very rapid. When stampings begin to pile up the press is tripped and the motor circuit opened before the third piece gets on the second.

Eliminated Limit Switch Maintenance

Accurate count of red-hot copper rods is obtained by a large copper producer through the use of a photoelectric cell which operates a counter. The copper rods ride along conveyors. The small amount of light given off by the rods is gathered by a 2½-in. lens and directed at the phototube, located at a distance to avoid intense heat.

Use of this counter has resulted in a considerable saving, due to the elimination of maintenance on the limit switches formerly used. The rods are heavy and since they travel at a comparatively high speed their impact on the limit switches was severe and produced a costly maintenance problem.

Saves $175 a Month

In order to cut power bills by reducing the demand charges, one large company put in a demand limitator and has been saving $175 or more per month ever since.

Total load in this plant is in the neighborhood of 1200 kilowatts, of which amount 900 kilowatts is imposed by two electric furnaces. Since these furnaces are the largest individual consumers of power, it was obvious that peaks could well be controlled by throwing one or the other, or both if necessary, off the line. Accordingly, the demand limitator was connected directly to them through the meter.

When a predetermined demand is reached the main circuit breaker on one or both furnaces is tripped. After the peak load has passed the circuit breakers must be closed manually in order to put the furnaces back into service.

The saving of $175 per month in demand charges represents a reduction in demand of about 150 kilowatts.

New Motors and Controls Pay Out in Year

Excessive maintenance costs and unsatisfactory performance of a large hoist in a chemical plant led to a careful study to determine the reason.

This study showed that the motor and control equipment then in use was not suitable for the application. Accordingly it was replaced with equipment specifically designed for the service.

Installation of the new equipment was followed by a 10 per cent increase in tonnage handled by the hoist, because operation was smoother, more efficient, and less tiring to the operator. Other benefits are greatly reduced breakage of cables and damage to buckets and other equipment.

Cost of the motor and control equipment was about $8,200. It is estimated that the increased efficiency and lower repair and maintenance costs will repay the cost of the equipment in less than a year.

Drying Lamps Save Space, Cut Finishing Cost

A manufacturer of small metal accessories for automobiles was able to reduce the time required to dry enamel and lacquer finishes to a small fraction of its former value.

For example, with the methods formerly employed it used to take 50 minutes to dry the finish on certain small parts. Now these parts are placed on a conveyor and passed under a bank of 250-watt drying lamps in concentrating reflectors. Under these lamps drying is accomplished in 8 minutes.

Formerly it took 1¾ days to convert raw material into finished product. Now only one working day is required. In addition, the space that used to be required for the drying operation has been released for other purposes.

Estimates show that the cost of drying parts by radiant heat is only about 25 per cent of the former cost, using other methods.

Prevents Cable Breakdown, Saves $3,600

Periodic checking of the insulation resistance of electrical equipment in a medium-sized power plant is credited with a saving of $3,600, at least.

One of the routine checks showed that the insulation of the main leads of a 300-kw., 230-volt, d.c. generator was seriously defective. Prompt action prevented a short circuit that would have seriously damaged, perhaps destroyed, 2,000 feet of heavy cable, aside from whatever damage might have been done to the generator.

Saves Time When Tapping In

When machines have to be shifted around occasionally or new ones installed, as is the case in most plants, the ability to connect the motors easily and quickly to the power lines is a distinct advantage. Over a comparatively short period it may show decidedly worth-while savings.

For example, in a plant in which power is distributed through a duct or trough system it became necessary to install a small machine at a certain location. If the wiring had all been in conduit, as formerly, a long run would have been required. It is estimated that the installation cost would

have been more than the value of the machine.

With the duct system, however, making the necessary electrical connections required less than an hour.

✦

Paper mill with 200 horse in induction motors raised power factor to 90 per cent by installing a 50-hp. induction-start, synchronous-run motor. Saving, $816 yearly, or 76 per cent.

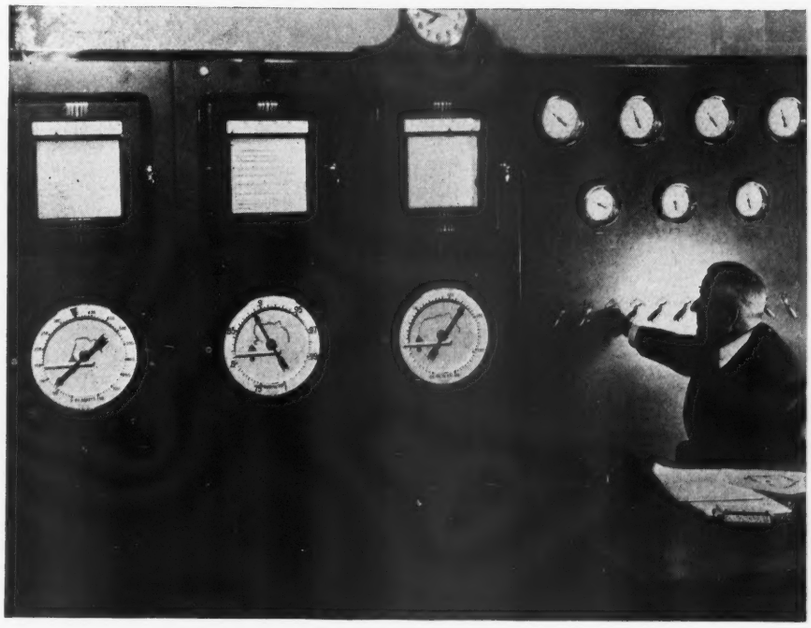
✦

Clamp-Type Ammeters Save Inspector's Time

Periodic checks on the current consumption of electrical units in a large plant are now made in less than one-fifth the time formerly required, thanks to the use of a clamp-type ammeter. When it is desired to make a test the jaws of the ammeter are merely hooked around a conductor or switch blade and current readings taken. There are no connections to make and circuits are never interrupted.

This simplicity of use has also made it easy to check regularly equipment which was often neglected because it was difficult to get at for testing in the conventional way. As a result of this regular attention defects are quickly detected and waste of power prevented.

Cut Power Bill $2,000



Instruments cost $1,500, but they save $2,000 a year in excess demand charges

With the help of certain instruments and the cooperation of the utility company, a manufacturer of instruments is avoiding extra demand charges which in the past have cost $2,000 a year on a load having normal maximum demand of 350 kilowatts.

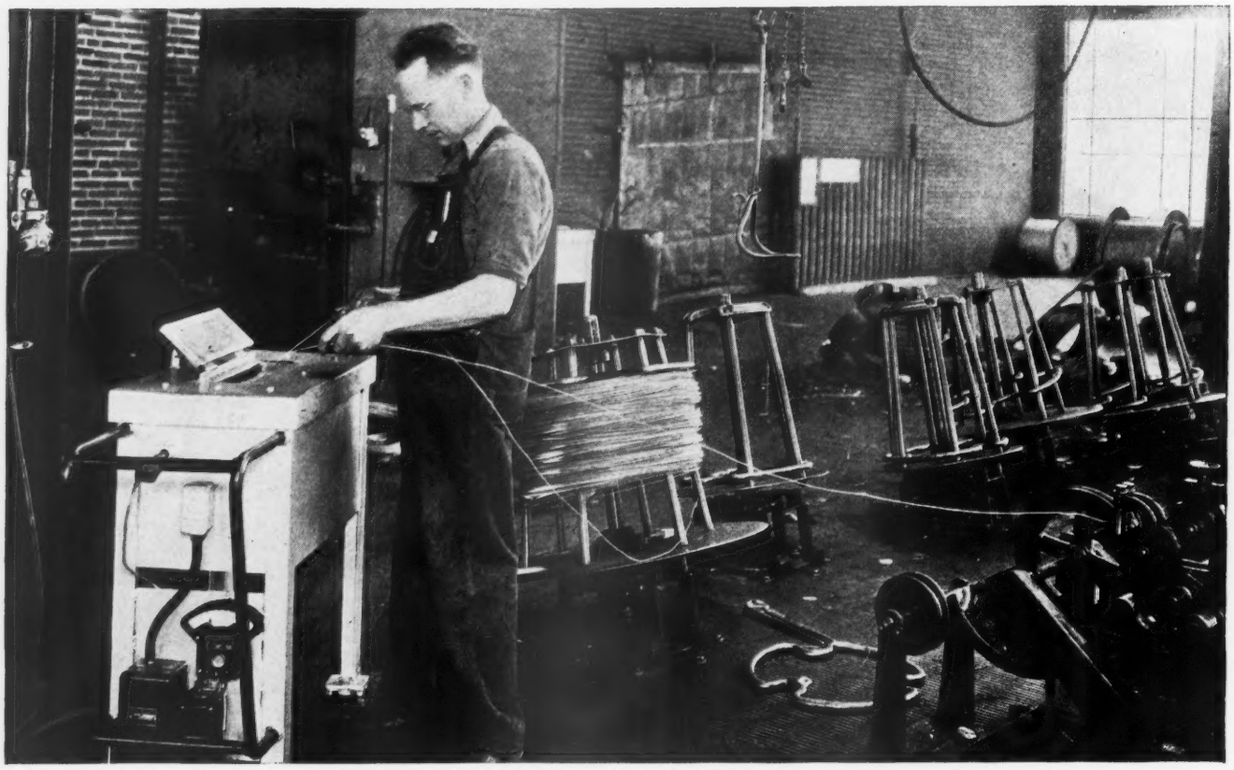
Since peak loads in this plant develop rapidly, at irregular hours, and may last only a few minutes, the maximum demand interval can be held within contract limits by cutting off part of the connected equipment automatically when a peak is reached. Besides the lighting and induction motor loads there is considerable electric furnace load. Some of the latter can be shut down for several minutes at a time and provide amply for over-peak-load reduction. The problem is to study load demand under all plant operating conditions and arrange a schedule that shuts down the right furnaces in the proper sequence and at the correct points on the load curve. To this end an instrument panel has been installed across one wall of the maintenance engineer's office. On it are three round-chart recorders, one for load, one for power factor, and one for voltage.

The load recorder is arranged to show either lighting load, power load, or total load as desired. When automatic load control is undertaken, the load recorder will become a recording controller.

Large blocks of non-inductive unity power factor furnace load cannot be dropped without considering its effect on power factor. The power factor recorder shows the effect of such load loss, and in addition shows the corrective effect of changes that are being made progressively in motor size and type and in the use of capacitors. This

LESS TIME OUT, WITH A CIRCUIT BREAKER

Overloads on a motor-driven portable tool used for various purposes were difficult to avoid, and therefore were frequent. When one developed, the fuses protecting the motor blew. Then the operator and the machine took time out from production until new fuses were put in. Substitution of a circuit breaker to protect the motor changed that situation. Of course, the breaker trips every now and then, but it takes only a moment to reset it. The result of this change has been a considerable increase in the productive time of the machine



Kettle, controls, and all—this miniature galvanizing plant is mounted on wheels, can be easily moved right to the job

recorder can show the power factor on either phase of the two-phase supply, or the factor of the total load.

By means of a manual switch the voltage recorder can show voltage from any leg to ground of any power or lighting bank. Since voltage at the buses is affected quite largely by plant load, this instrument has obvious advantages. It appears that instruments and panel will pay for themselves in less than a year. The three recorder instruments cost about $1,500. If $2,000 is saved per year on charges for excess demand, the instruments will be paid for in 9 months. This is a return of 133 per cent per year.

Puts Galvanizing Plants on Wheels

Electric heat solved an important problem in a very simple manner for a wire rope manufacturer.

Wire rope is made by twisting galvanized-iron wires into strands, the desired number of which are then twisted together to form a rope. Since the length of wire in a coil is limited it becomes necessary to weld the end of the wire in one coil to the end of another coil. Welding removes the galvanized coating, and it was desired to provide some simple way of restoring it and thus leave no spots subject to attack by rust.

For this purpose use is made of a small galvanizing kettle 1 foot long, 3 inches wide, and 3 inches deep, which is surrounded by a lead bath heated by a 2,200-watt immersion heater. Thermostatic control is provided.

The kettle, controls, and all are mounted on wheels so that the outfit can easily be moved about. Several of these miniature galvanizing plants are used by this concern.

Saved 40%, Got More Light

Several expedients are open to the plant that finds it necessary to increase levels of illumination when the lighting system is already loaded to capacity. For example, another wire can be pulled in and a 115/230-volt system formed by reconnecting the transformers. The system can be split into two parts, each fed by a separate transformer. The distribution voltage can be raised and a small transformer installed to supply each lamp, or small groups of lamps. Or the system can be divided into sections, each of which is fed by a transformer at the load center. Obviously these methods are not all equally suitable under all conditions.

Material and labor costs are involved in putting any of these schemes into practice. Therefore the problem becomes one of selecting the scheme that will give the results desired at the lowest cost.

In one large plant whose lighting circuit capacity was not adequate for the increased load that would be imposed by raising foot-candle intensities to a considerably higher level, a thorough study was made of all feasible methods of handling the increased load. As a result it was decided to split the lighting system into several sections, run 2,300-volt primary feeders directly to the load centers and there install 2,300/230/115-volt transformers. Installation of transformers at these points was permissible, because the type used is filled with a non-flammable liquid and does not need to be placed in a fireproof vault. In this instance the transformers were mounted on platforms attached to the building columns.

This method of increasing the capacity of the lighting system showed a saving of about 40 per cent over the cost of obtaining the same results in

other ways. The principal saving was in the amount of secondary copper required.

Pay 160% Per Week

Loss of production while blown fuses were being replaced in a metal-working plant reached the point where something had to be done about it.

Action took the form of installing circuit breakers to protect the motors driving certain key machines. The saving due to decrease in loss of productive time and cost of replacing fuses is estimated to represent a return of about 160 per cent per week.

Changing Their Fuses Stopped Blowouts

The hydraulic pump on a dredge operated by one company is used to lift sand from the bed of a lake up to the grading screen. This pump is driven by a 300-hp., three-phase motor. The load on the motor fluctuates widely, resulting in heavy surges which formerly caused the ordinary 600-amp., 600-volt fuses, protecting the motor to blow out from two to four times a day. It is estimated that these interruptions entailed a loss in production of about 150 tons of sand.

Since the installation of "super lag" fuses there have been no interruptions due to blown fuses.

Vaporproof Motor Gives 9 Times as Much Service

Moisture, heat, and fumes impose such severe operating conditions that the average life of motors on one of the drives in the dyehouse of a textile mill was only 12 to 14 months.

Eventually, a standard vaporproof motor was installed, replacing the type formerly used, and this drive ceased to give trouble.

After 9 years' service the motor was taken down for inspection and cleaning, and was found to be in a perfect operating condition.

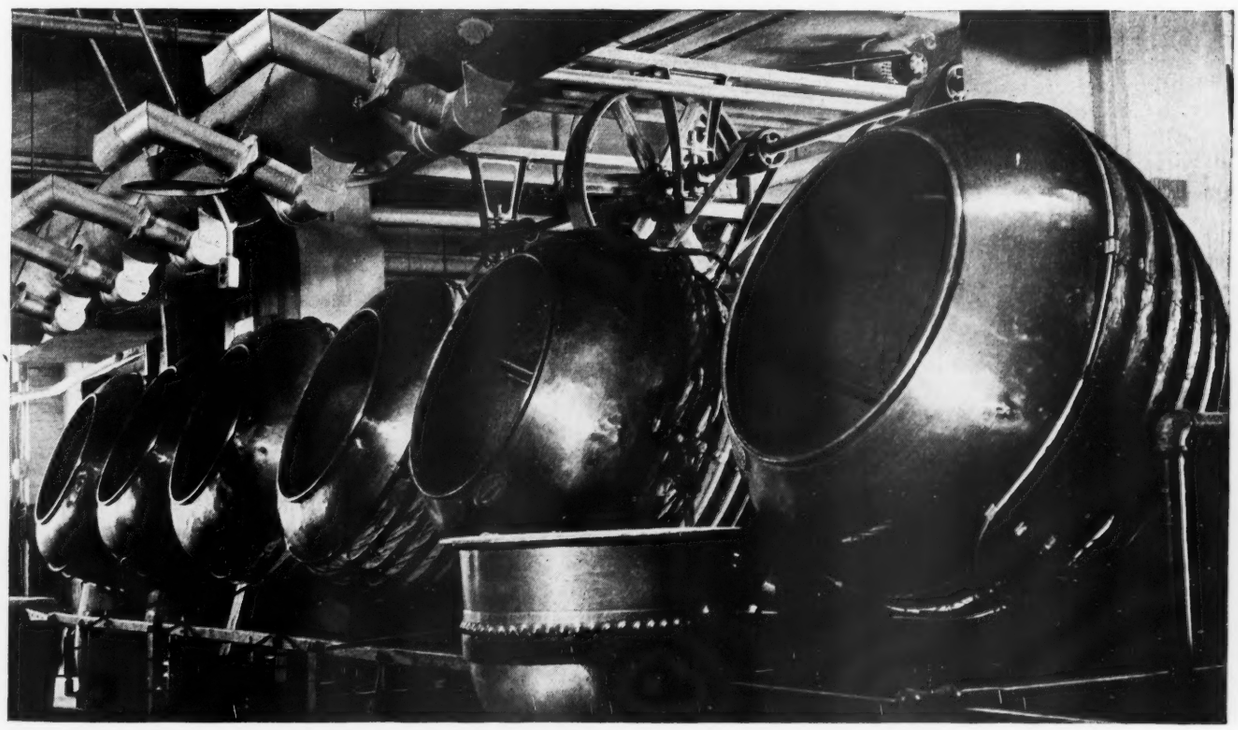
Replaced Motors to Cut Demand Charge

A metal-working plant discovered through costly experience that use of the wrong type of motor can seriously affect plant demand charges.

General-purpose motors had been applied to a large number of punch-presses. Characteristics of this type of motor, and of the load, helped to lead to the use of larger motors than was actually necessary. For example, 20-hp. general-purpose motors were used on presses that could be driven just as well by 10-hp. motors of the proper type. Again, 10-hp. motors were being used where the right type of 5-hp. motor would be satisfactory, and so on. High demand peaks and correspondingly heavy charges were the inevitable result.

It is estimated that, when the pro-

INCLOSED MOTOR COSTS $165, ADDS 39 WORKING DAYS



Granulated sugar dust clogged the drive for six revolving pans in the plant of a large candy manufacturer so seriously that shutdowns were required every two weeks to dismantle, clean, and reassemble the motor. This lost time amounted to almost 20 per cent of the year's working days. Eventually the open-type motor used on this drive was replaced by a totally inclosed, fan-cooled motor. One result of this change was to add 39 working days yearly to the productive time. In addition about $106 was saved annually in maintenance costs. The investment for the change-over was $165. Therefore the reduction in maintenance expenses alone gives a return of 64 per cent

gram of remotoring is finished, there will be a saving of several hundred dollars a month in demand charges.

Big Electric Oven Goes to Big Parts

Usual procedure is to take the work to the baking oven, but this order has been reversed to good advantage in one plant. Electric heat has made it possible to do this.

Some of the parts made by this company are very large. Formerly they were finished with an air-drying paint, but changes in specifications and requirements made it necessary to apply a baked finish. Inconvenience and cost of transporting such large parts to a stationary oven led to the decision to use one that is portable.

To meet the requirements an oven 16 feet high and 9 feet in diameter was built in the form of two half-cylinders hinged on one edge and provided on the other with bolts and clamps for holding together. The two halves are mounted on roller-bearing wheels, for easy opening and closing.

The oven is heated by 100 strip heaters of 500-watt rating. With these heaters it can be brought to a temperature of 250 degrees Fahrenheit in 45 minutes. When baking is to be done, the shop crane carries the oven to the work, and it is plugged into a conveniently located power outlet.

Use of this oven has resulted in a notable saving of time and floor space. Formerly it took from 24 to 48 hours to air-dry one coat of paint. Now three coats can be baked in 10 to 15.

Temporary Overloads Blow No Fuses

When a new cotton ginning plant on the West Coast was put in operation a few years ago, regular 400-amp. fuses were installed to protect the electrical equipment. During the first year the entire plant was frequently shut down by blowing of these fuses. Sometimes these interruptions occurred twice within 24 hours. They were caused by the temporary overloads that resulted when the cotton pressing machines were forced too hard.

Cost of these production delays, and the expense of replacing fuses, was eliminated by the installation of "superlag" fuses in place of the others. None of these fuses has blown since.

Special Motor Saves $6,000

In a plant that generates its own power, a load of 321 kilowatts at 65 per cent power factor caused sufficient overloading of the 350-kw. generator to result in excessive heating. Under these conditions current for operating three fans, which imposed a load of about 111 kilowatts, had to be purchased at a cost of about $500 a month, leaving a 210-kw. load on the generator.

Three induction-start synchronous run motors, totaling 130 horsepower, were installed in place of the induction-type fan motors and connected to the plant line. The new motors increased the load on the generator to 321 kilowatts, but by reason of their ability to raise the power factor to 82.5 per cent the generator was able to carry the load with appreciably less heating than formerly.

In addition to a saving of $500 per month, or $6,000 per year in the cost of purchased energy, correction of power factor by the new motors brought about better voltage conditions with resultant better performance of all the other motors.

Motor Maintenance Costs 5c a Year

Records covering the cost of motor maintenance in a large textile mill show that over a period of twenty years less than 5¢ per motor per year has been spent for maintenance and repair on an installation of about 4,000 machines. These motors have been operated on an average of 41 hours per week, 50 weeks per year.

Motors are used in more severe service in many other plants, and maintenance costs may well be expected to be higher. But it is safe to assume that excessive costs are a sure sign that something is wrong and that an investigation is in order.

Reversing usual procedure, this big electric oven for big parts goes to the job

29 YEARS ON THE ROCK PILE!

Here's a True Story on What Happens When Lo-Maintenance Motors are Put on a Tough Job . . . Operating Rock Pulverizers . . . with Lime Dust Filling the Air! Read This Story of 29-Year Performance . . . the Kind of Money-Saving Service Allis-Chalmers Motors Offer You!

TURNING ROCK CRUSHERS . . . WITH ABRASIVE lime dust making operation difficult — these 50-hp Lo-Maintenance Motors have a fine record of going 29 years without running up high repair or maintenance expenses. And they are still giving daily service!

Suppose your lifetime job was to reduce a huge rock pile to lime powder! You'd want to do it as cheaply as possible . . . with motors that would stand the shock and abuse of rock crushing work without running up high maintenance!

That's exactly the problem at the Waukesha Lime & Stone Company, Waukesha, Wisconsin. The job is as hard as any you'd ask motors to perform. And to make things even worse — abrasive lime dust fills the air . . . seeps into the motors.

But — two Lo-Maintenance Motors have been handling this tough assignment year after year, for 29 years . . . without running up high repair or maintenance costs!

And that's the kind of performance that makes economy-minded operators sit up and take notice! And it's these qualities of dependability under severe operating conditions . . . long life . . . freedom from shutdowns . . . low repair and maintenance costs — that *YOU* want in the motors you buy!

Save Power Dollars with Lo-Maintenance Motors!

For when you buy Allis-Chalmers Lo-Maintenance Motors, you get motors that deliver more than just a rated horsepower. Into these motors are built the results of Allis-Chalmers 90 years of progressing with industry.

To get this extra-value performance, Lo-Maintenance Motors have been made with indestructible rotor . . . distortionless stator . . . high carbon steel frame . . . and no skimping anywhere in materials.

Get the full story on Lo-Maintenance Motors and how they can save you power dollars. Call the nearest Allis-Chalmers district office. Or write direct to Allis-Chalmers for the money-saving facts!

A-1158

Over 90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!

ELECTRICAL DIVISION
ALLIS-CHALMERS
MILWAUKEE · WISCONSIN

"We Wiped out Shutdowns that cost about $500.00 each by using BUSS *Super-Lag* FUSES"

H. N. DAVIS, *Purchasing Agent*
CENTRAL FORGING CO., CATAWISSA, PA.

"HERE'S OUR EXPERIENCE"

continues Mr. Davis. "We use specially designed forging machines for forming and punching our union forgings from steel bars. The heavy momentary overload on these forging machines formerly caused fuses to blow frequently. The die then had to be dismantled and the pieces of steel cut out of it.

"The loss in time and material we figured cost us about $500.00—and the shutdowns were occurring so often that we even had a special cutter made at a cost of $300.00 to speed up cleaning out the die.

"Some time ago, at the suggestion of a salesman, we switched to BUSS Super-Lag Fuses. Since then we practically wiped out these costly shutdowns as the BUSS fuses have time-lag enough to hold the momentary overloads on our forging machines."

Here's Why BUSS *Super-Lag* FUSES Will Save Money For You, Too

Needless opening of fuses can generally be traced to one of two causes: a fuse-case design that permits the development of poor contact heating or a fuse-link design that doesn't give sufficient time-lag.

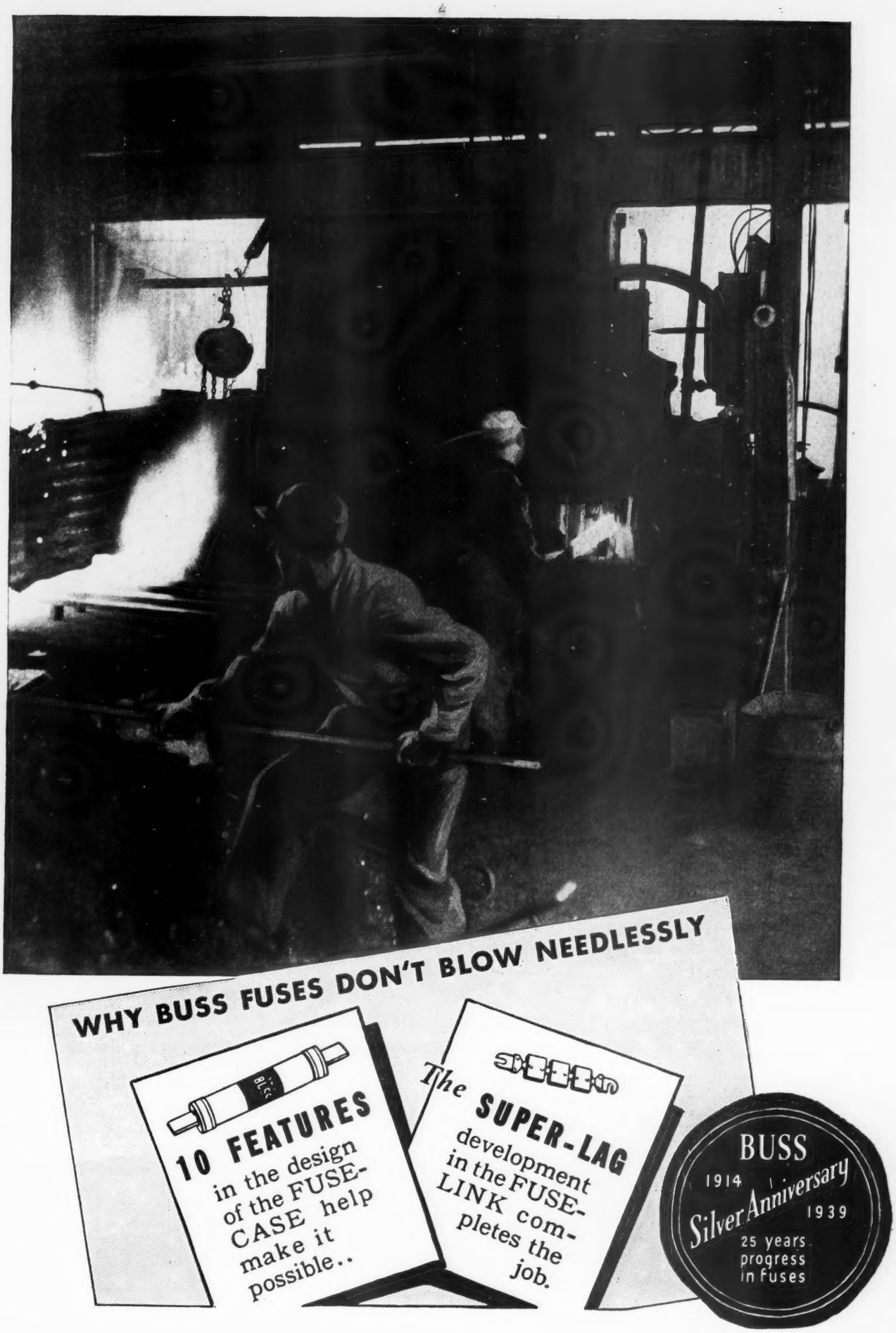
Years of engineering research and field and laboratory tests have produced in BUSS Super-Lag fuses a design that practically eliminates all needless opening from either of these causes.

Hence users of BUSS fuses enjoy a freedom from needless interruptions not possible with any other fuse.

Since this means a saving in time and money to your company, why not start today to specify BUSS Super-Lag fuses for all your fuse needs?

And if you would like to have a more complete picture of the details of BUSS construction so that you can show others just why BUSS fuses are suited to the particular needs of your plant, let us send you a copy of the RB book on fuses.

It shows, in quick reading style, how the design of the BUSS fuse can help you abolish senseless shutdowns in your plant. A line from you will bring a copy by return mail. BUSSMANN MFG. CO., University at Jefferson, St. Louis. Division of McGraw Electric Company.


WHY BUSS FUSES DON'T BLOW NEEDLESSLY
10 FEATURES
in the design of the FUSE-CASE help make it possible..
The SUPER-LAG
development in the FUSE-LINK completes the job.
BUSS
1914
Silver Anniversary
1939
25 years progress in fuses

FROM THE NOTE BOOK OF A *PROFIT ENGINEER*

Business - oil burner pumps
Machine - modern grinder
Part - pump plate
Operation - finishing
Old rate - 40 per hour
New rate - 140 per hour
First cost - same as old machine
Production increase - 250%

PRODUCTION TRIPLED BY *Profit Engineering*

WITH about the same machine investment, a modern grinder turns out 140 oil burner pump plates an hour—instead of 40 on the old type machine. Production increased 250% . . . costs cut substantially.

In every industry, modern machines and methods are striking heavy blows at high costs... are improving the profit margin. It might pay you to do some *"Profit Engineering"* in your business. Your machinery builders will help you—and Westinghouse will give you the most modern drive equipment to match your new machines. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Penna.

★

WHAT IS A *"PROFIT ENGINEER"*?

He is a man with the ability to find ways of doing a job better, quicker, or cheaper. He may be someone in your own organization—or a salesman calling on you. Or—he may be an executive who knows a good idea when he sees it — and who provides authority and means to turn the idea into a profitable investment.

Are you a PROFIT ENGINEER?

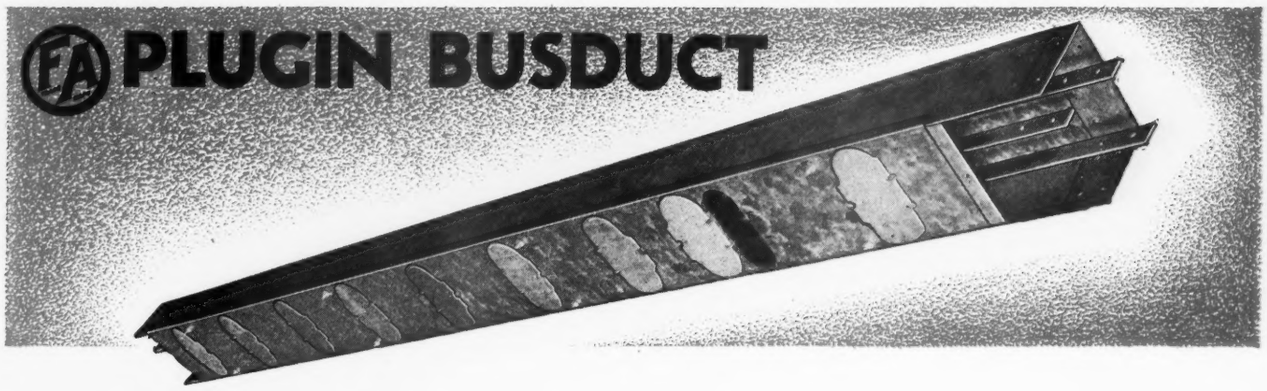
J-94164

Westinghouse

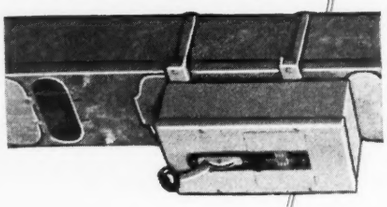
ELECTRICAL PARTNER OF INDUSTRY

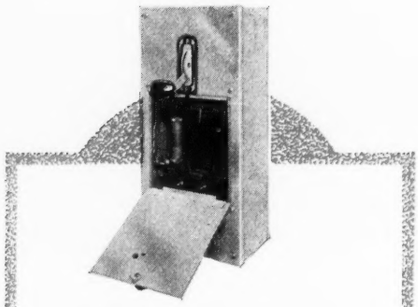
W WESTINGHOUSE ELECTRIC

(FA) PLUGIN BUSDUCT



(FA) *Plugin Busduct with Shutlbrak Switch Plug-in place*





(FA) Shutlbrak Safety Type Enclosed Switches

For heavy-duty industrial use — of high grade, rugged construction, embodying a new switching principle — *the movement of a shuttle in a totally enclosed chamber.* When the current is broken, the final arc is taken by specially constructed arcing tips *on the reverse side of the clips* from where the current is normally carried.

The Modern, Compact, Flexible, Efficient Method for Power Distribution

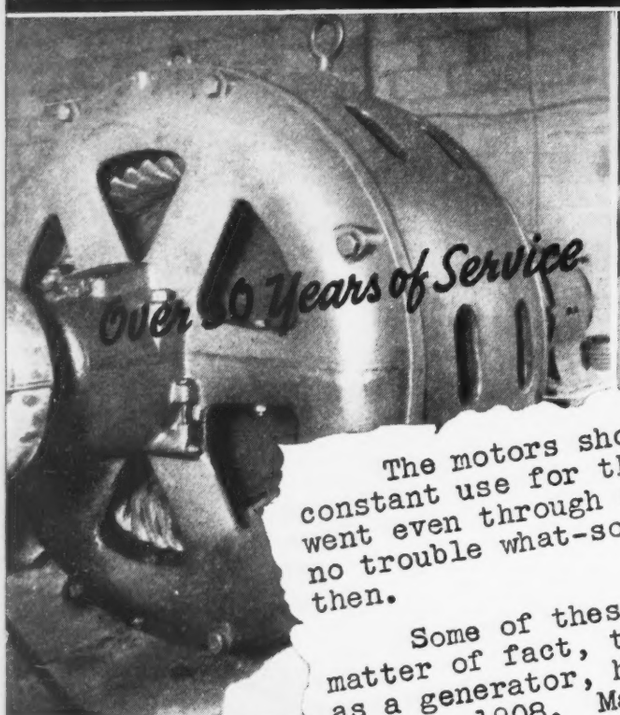
(FA) Plugin Busducts consist of standard 10-ft. sections, arranged with nine plugin outlets in cover, on 12" centers. For 2, 3 and 4 wire feeder systems. 250 volts D.C., 575 volts A.C. maximum.

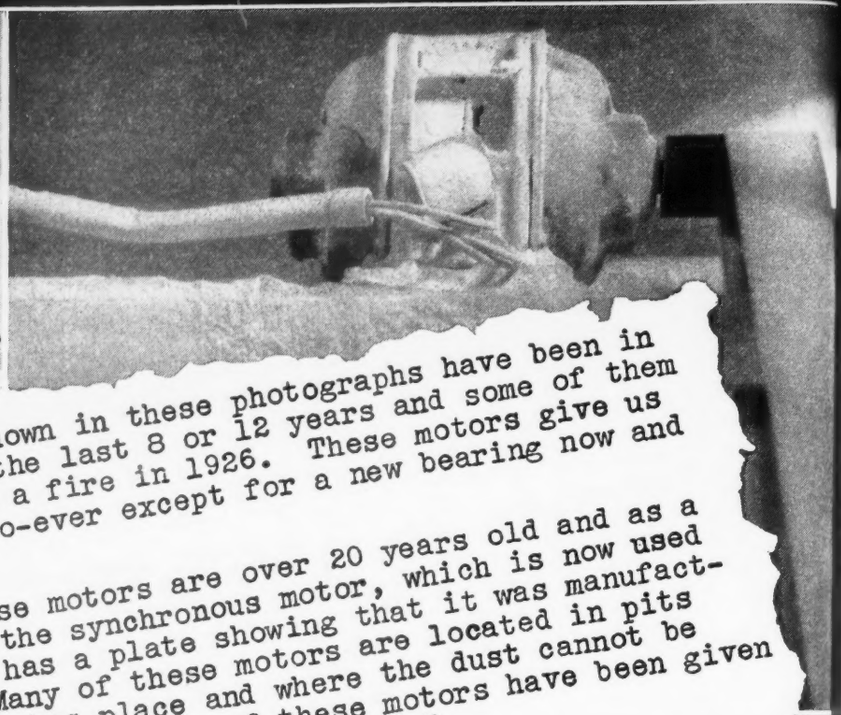
Busducts are made of galvanized steel or aluminum, with proper support for attaching to either walls or ceilings. Flexibility of installation is provided by suitable elbows, tees, end boxes, intermediate feed-in or feed-out boxes — all adapted to fit required space or position. Future extensions may be readily made to existing installations.

Bus bars are of copper — rigidly supported at 30-in. intervals with insulating blocks that assure proper spacing to meet requirements of the National Electrical Code. Contact surfaces of connecting bars are silver plated to prevent oxidation.

Send for further information — let us show you how you can use (FA) Plugin Busducts to most effectively arrange your distribution system — economically, easily and according to the latest accepted practice . . . Frank Adam Electric Company, St. Louis, Mo.

Marble Dust! Fire! Time!



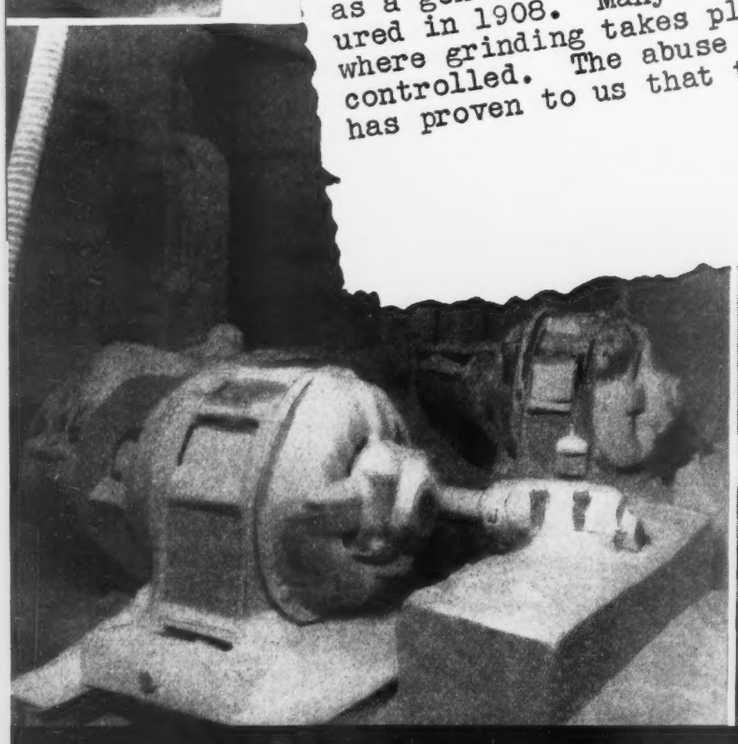


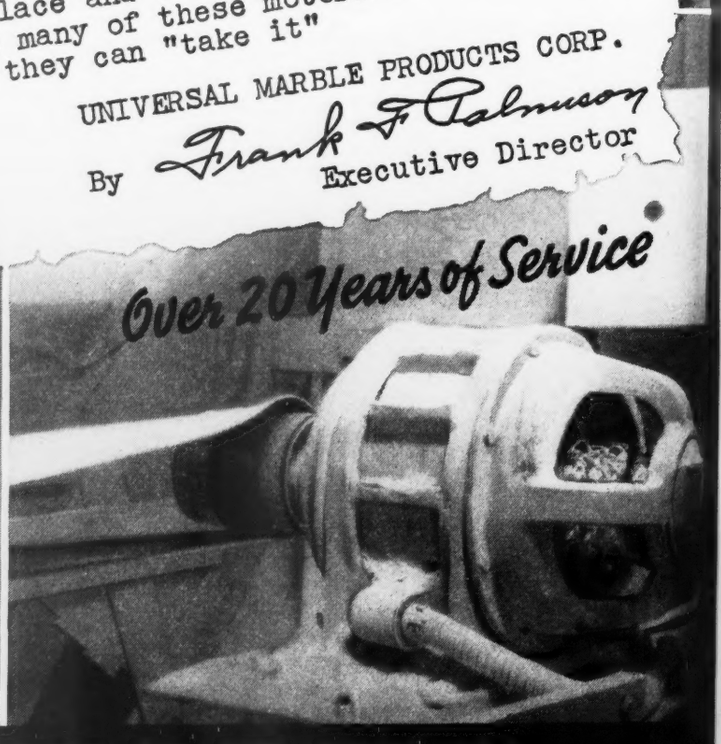
The motors shown in these photographs have been in constant use for the last 8 or 12 years and some of them went even through a fire in 1926. These motors give us no trouble what-so-ever except for a new bearing now and then.

Some of these motors are over 20 years old and as a matter of fact, the synchronous motor, which is now used as a generator, has a plate showing that it was manufactured in 1908. Many of these motors are located in pits where grinding takes place and where the dust cannot be controlled. The abuse many of these motors have been given has proven to us that they can "take it"

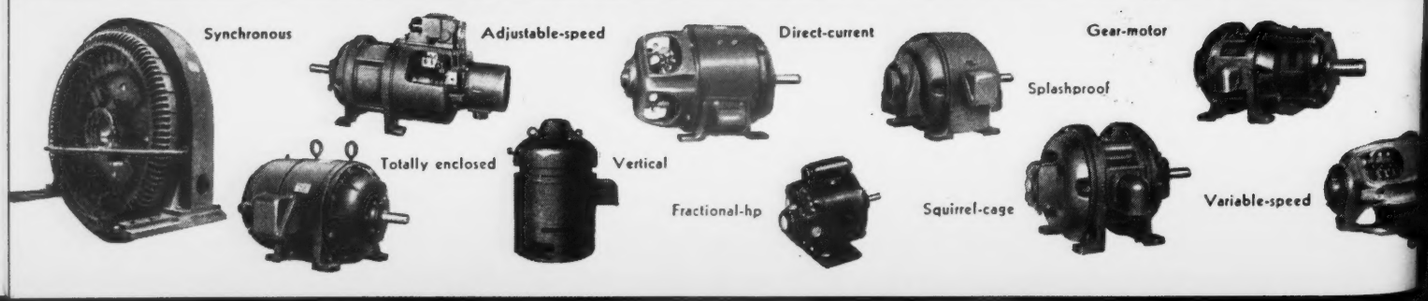
UNIVERSAL MARBLE PRODUCTS CORP.

By Frank F. Palmason
Executive Director





THERE'S A G-E MOTOR TO FIT ANY JOB



-Test G-E MOTORS

At Universal Marble Products Corp.

Read What Mr. Palmison Says About How They Passed These Tests

THE statement on the opposite page from Mr. Palmison, Executive Director of the Universal Marble Products Corp. at Thornwood, N. Y., tells how G-E motors have been tested by marble dust, fire, and time. In spite of these severe conditions, the G-E motors have cost practically nothing for upkeep.

The dust alone is a severe test of motor insulation. Powdered dolomite and marble dust, products of this plant, are very abrasive. Totally enclosed motors would usually be recommended for such locations.

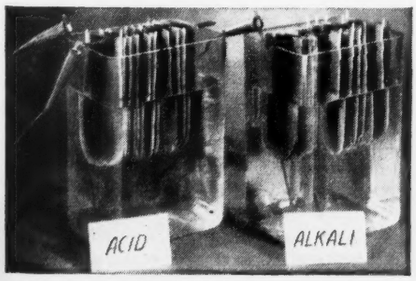
Open G-E motors, however, have not only stood up under the dust, but have passed through a fire, and have already turned in long operating records. They have, as Mr. Palmison says, given "no trouble whatsoever except for a new bearing now and then."

Why Is Such Performance Possible?

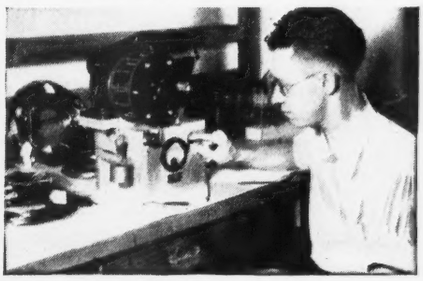
One reason G-E motors pass performance tests like this is the thorough testing at every point in their manufacture. Designs, materials, and the motors—both finished and in process—are all continually checked by numerous tests such as those shown below.

G-E motors are available in all sizes and types. When you need information on any type, call the nearest office of General Electric, the G-E Supply Corp., or G-E motor dealer. General Electric, Schenectady, New York.

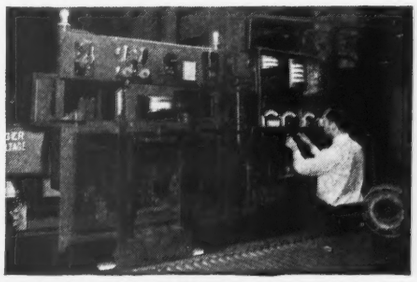
TYPICAL FACTORY TESTS ON G-E MOTORS



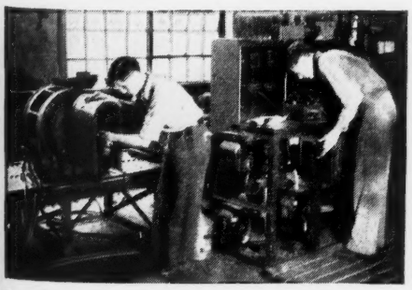
Acid and alkali tests prove that General Electric insulating varnish protects motor windings against mild corrosive agents



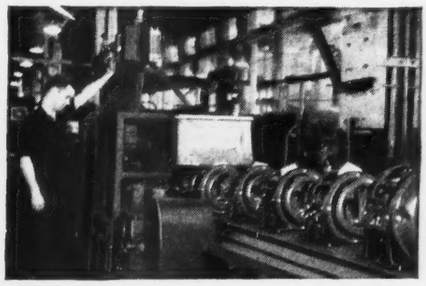
Abrasion test. This machine tests the resistance to abrasion of the enamel film on magnet wire used in G-E motors



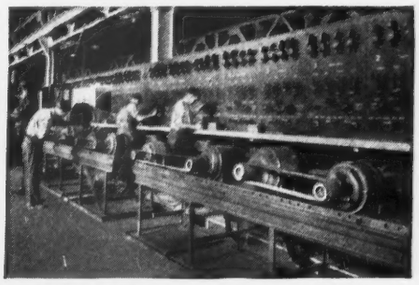
High-potential test No. 1 checks the stator windings of G-E motors before they are dipped in the insulating varnish



A complete electrical test is made on all motors before they leave production, even though they have already passed many tests



High-potential test No. 2 is likewise made on each motor to prove the dielectric strength of the insulation



Punishing life tests on representative G-E motors include service more severe than any conditions motors normally meet

GENERAL ELECTRIC

You can't salvage TOASTED WIRE

You can scrape burnt toast and save it for the breakfast table, but there isn't anything you can do to restore toasted wire to dependable current carrying condition once heat has ruined it.

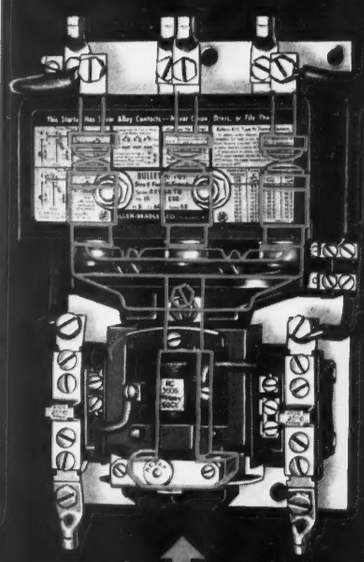
When wire insulated with vegetable or other organic materials is installed in a hot location it's just like putting bread in a toaster. The insulation eventually becomes so dry and brittle that vibration opens cracks and makes it ready for moisture-produced short circuits, repeated repairs and finally, replacement. Just how long this takes depends only on the intensity of the temperature . . . the hotter the quicker. And if the wire should ever catch fire, the flames will gallop along it, burning off the insulation and igniting everything inflammable in the vicinity.

Think of burnt toast when you're wiring around steam lines, boilers, furnaces and other hot spots and use a wire that won't dry out under high temperatures or burn under any condition. Rockbestos heat-resisting wires are heat-sealed and fireproofed with inorganic asbestos which is also highly resistant to oil, grease and corrosive fumes. They reduce equipment outage and maintenance expense. For advice, recommendations, samples and catalog write to Rockbestos Products Corporation, 938 Nicoll St., New Haven, Conn., or telephone the nearest sales office — see below.

TEN TESTED ROCKBESTOS VALUES

1. Heatproof
2. Fireproof
3. Permanent
4. Lower maintenance cost
5. Resists heat and vibration
6. Saves work
7. Oil and Grease-proof
8. High overload capacity
9. Permanently flexible
10. Greater carrying capacity

New York, Buffalo, Cleveland, Detroit, Chicago
Pittsburgh, St. Louis, Los Angeles, San Francisco, Portland, Ore., Seattle



Advantages of the A-B Straight-Line Motion

1. No troublesome bearings, pins, pivots, or complicated mechanisms.
2. No danger of accidental closing.
3. Gives equal contact pressure which makes double break contacts reliable.
4. More compact switch mechanism.
5. No danger from contact rebound.
6. Increases arc rupturing capacity by allowing enclosure of contacts.
7. Utilizes solenoid magnet, with low drop-out and pick-up voltages.

"So that straight-line motion makes your monkey jump up and down!"

There is no need to "monkey" with Allen-Bradley solenoid starters after they are installed. One reason is the simple, frictionless, straight-line motion of the movable contact member. It has no bearings, pivots, or pins to cause trouble. Another reason is the long life, double break, cadmium silver alloy contacts, which give best service when left entirely alone. With generous wiring space, white interiors that illuminate the starter, accessible terminals, and many convenient knock-outs, these starters are easy to install. Use these rugged reliable Allen-Bradley solenoid starters throughout your plant. Enjoy the satisfaction of knowing that your control troubles are over.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

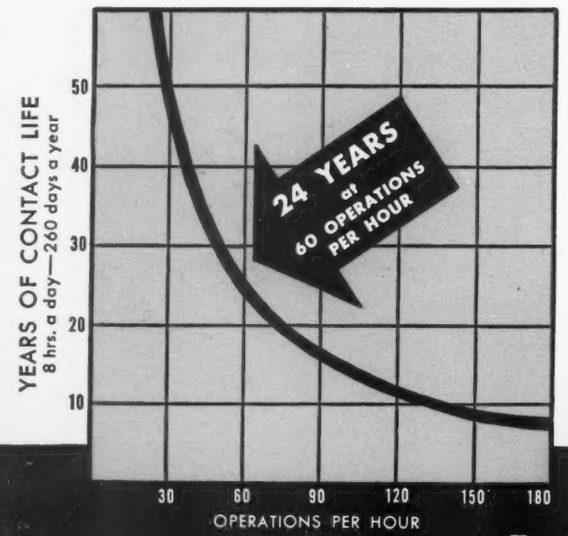
CONTACT TESTS SHOW 3 MILLION INTERRUPTIONS

Mechanism of Size 1, Allen-Bradley Bulletin 709 Solenoid Starting Switch, tested at 150 amperes, inductive current, and 220 volts.

Testing an Allen-Bradley Bulletin 709 Solenoid Starting Switch to determine how many times it is capable of interrupting an overload. In this test, which is a particularly severe one, many years of starter life are condensed into a few weeks or months. Thus is starter stamina measured.

—at SIX TIMES RATED CAPACITY!

What this means in Contact Life



Use this chart to determine how long the contacts on a Size 1, Allen-Bradley Solenoid Starter will last on your job with no maintenance or attention whatever.

Imagine, if you can, three million switch interruptions at six times rated load! That's the average life you can expect from the contacts in an Allen-Bradley Size 1 Solenoid Starter, as indicated by actual tests. It's equivalent to one operation a minute continuously, eight hours a day, for 24 years.

The secret of such unequalled performance lies in the contacts themselves and their vertical straight-line motion. These double break contacts, being made of a patented cadmium silver alloy, never need cleaning or filing, as do copper contacts. The cadmium in the contact metal helps to snuff out the arc. Each main contact unit is enclosed in its individual arc chamber, thereby increasing the capacity of the switch, without danger of flashovers. It is no wonder these Allen-Bradley contacts are free from trouble and are good for millions of operations with no maintenance whatever. Allen-Bradley Company, 1321 S. First Street, Milwaukee, Wis.

A-B

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

Cuts _ CORNERS _ COSTS
...IN MAINTENANCE TESTING

the WESTON
MULTI-RANGE AC CLAMP AMMETER

With Clamp-Ammeter testing so simple . . . requiring so little time . . . plants everywhere are adopting this modern test procedure. *There are no hook-ups necessary . . . no transformers or shunts required . . . no circuits to be disturbed.* Simply place the clamping jaws around the conductor or switch blade, and the meter indicates the current in the circuit. Tests on AC electrical circuits are made in a fraction of the time usually required.

Be sure you have all the facts on this modern, inexpensive maintenance tool. Return the coupon today.

Tools for efficient maintenance... the WESTON Clamp-Ammeter and the Junior Voltmeter.

WESTON *Instruments*

Weston Electrical Instrument Corp.,
628 Frelinghuysen Ave., Newark, N. J.

Send literature on the WESTON AC Clamp Ammeter.

Name _____

Address _____

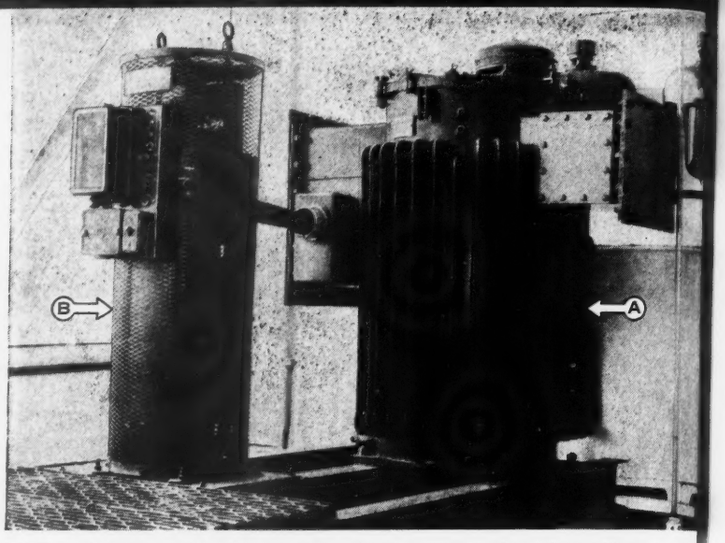
City _____ *State* _____

Specify G-E Pyranol Transformers for All INDOOR Installations

You can install them right at the load center, without costly vaults, because Pyranol is noninflammable

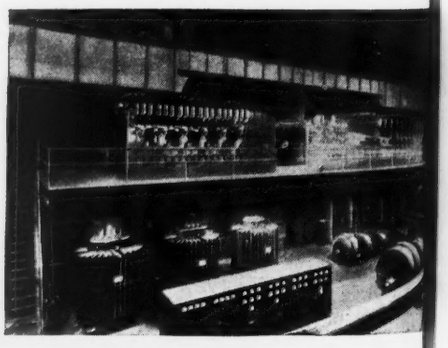
Use Them to Modernize Your Lighting Circuits

THINKING of improving the lighting in one of your buildings? Maybe you can save your present wiring by dividing the circuit into several sections and installing a G-E Pyranol transformer at the center of each section. Keep your present secondary wiring and run small 2300-volt primary copper to serve the transformers. Savings as high as 40 per cent have been made by this method. The technique is completely described in Bulletin GEA-3180. Ask your G-E representative for complete information on Pyranol transformers to meet your requirements, or write General Electric Co., Schenectady, N. Y.



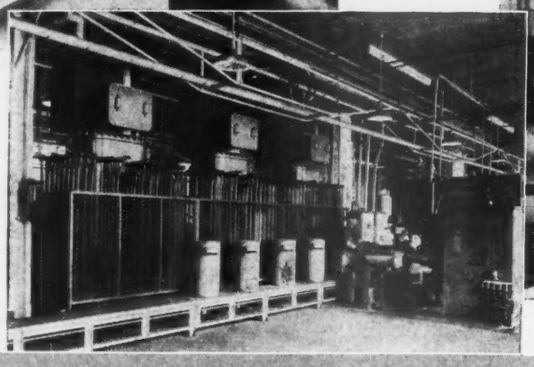
G-E Pyranol transformer (A) installed near the ceiling at the center of a modernized lighting circuit. G-E air-cooled regulator (B) provides precise voltage control for the lamps

Use Them for Your Power Circuits and Enjoy the Benefits of Load-center Distribution

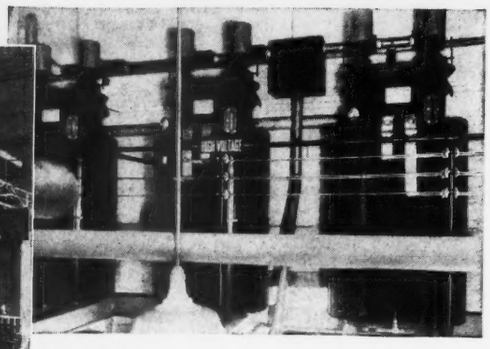


(Right) Load-center distribution at Jones & Laughlin Steel Corporation plant. Note locations of G-E Pyranol transformers right at the load, with no enclosing vaults

(Above) At the Boston Woven Hose & Rubber Company plant, marked savings were made because it was possible to install G-E Pyranol transformers in the nonproductive area right under the floor



(Right) G-E Pyranol transformers saved the day for us at our Pittsfield Works. Three 635-kva Pyranol transformers located right beside heavy-current-consuming resistance-welding machines on an upper floor cut costs and losses



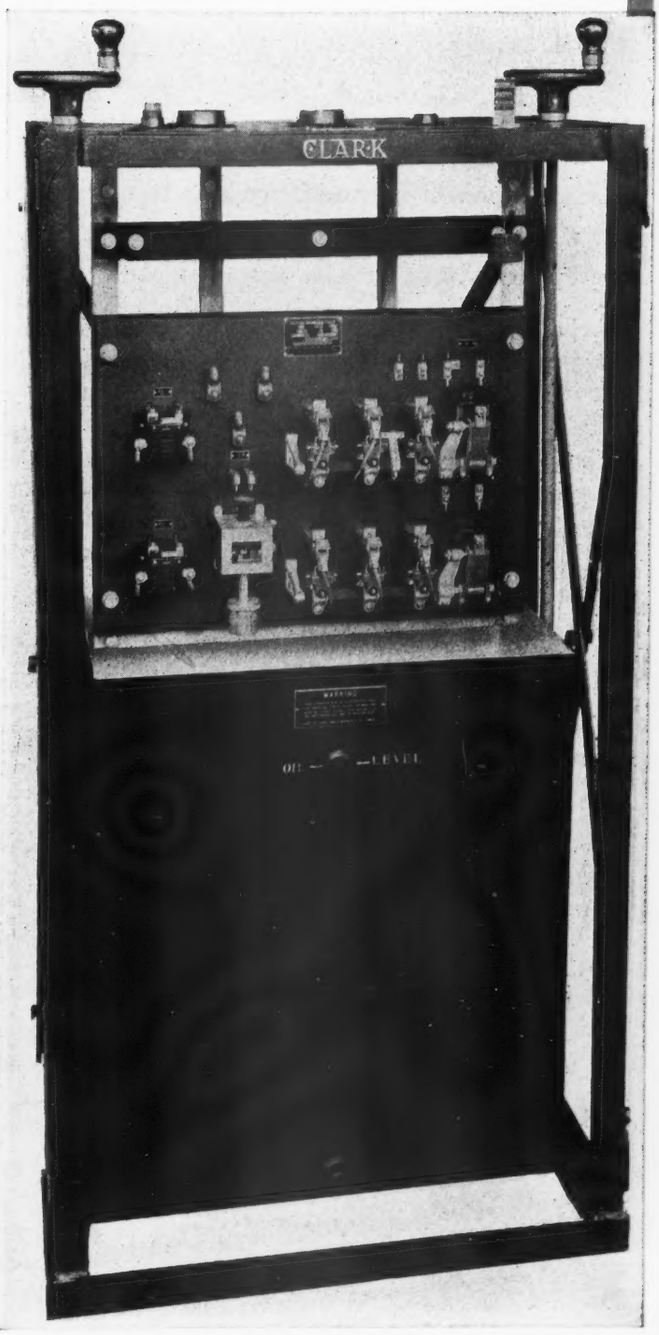
By mounting [illegible] Pyranol transformers on steel [illegible] above the [illegible] level, Acme [illegible] eries, San Fran[illegible] conserved [illegible] space in its [illegible] room. Saving [illegible] installed cost [illegible] realized becau[illegible] vault was nece[illegible]

GENERAL ELECTRIC

300-72

BY PERFORMANCE

it "WINS FRIENDS and INFLUENCES PEOPLE"



● The rugged construction of this "3C" Special Bulletin 5840 Oil Immersed Primary Resistance Motor Starter may not fit in with ***decor moderne,*** but in atmospheres charged with highly explosive gas, dust, or fumes, you'll be impressed by its protective features.

It's designed and built in accordance with Underwriters Specifications for Class 1, Group D, Hazardous Locations, and with each individual unit of apparatus given wide electrical clearances, plus oil immersion, it's proof against errant danger-laden atmospheres.

Of course, it provides adequate overload protection to the 15 H.P., 440 Volt, 3 Phase, 60 cycle Motor it controls, and on performance alone, this starter wins friends.

Our nearest office will gladly consult with you about "3C" Motor Control for hazardous conditions.

OFFICES IN PRINCIPAL CITIES

THE CLARK CONTROLLER CO.

1146 EAST 152ND ST. CLEVELAND, OHIO

SAVED $400 TO $2250

every month for 8 years

Raising power factor from 72% to almost unity results in substantial savings in power costs, for Gillette Rubber Co.

Twelve years ago, the Westinghouse representative suggested to Gillette Rubber Company officials that they prepare for penalties in power contracts arising from low power factors.

Management started a program of utilizing synchronous motors and speed reducers in place of induction motors, on heavy drives. In 1927, when the plant was driven by induction motors, power factor was about 72%. Since installation of synchronous motors, has been raised to 99.64% in February, 1939.

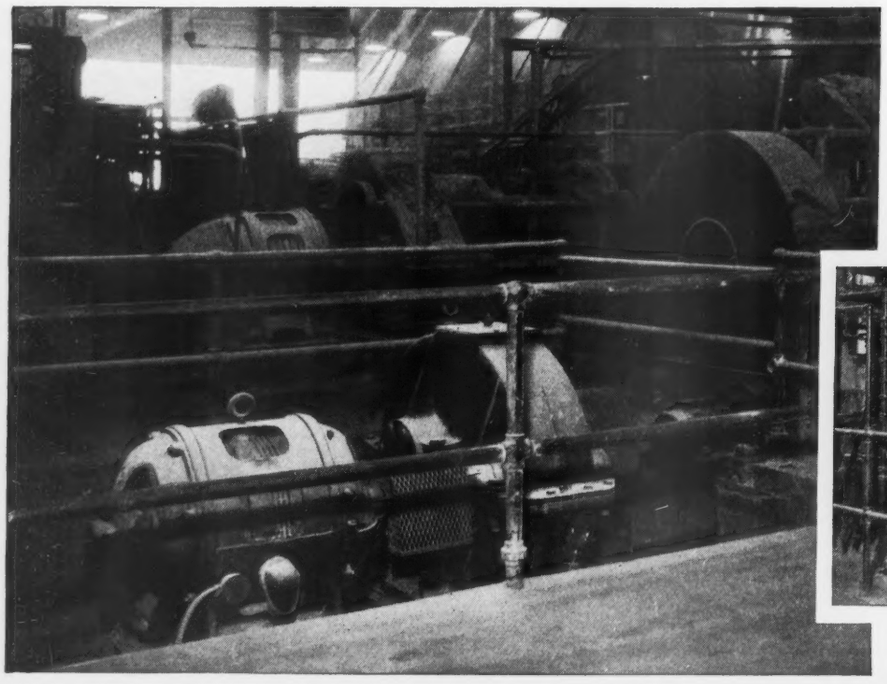
In dollars, this represents a saving of from $400 to $2250 per month, based on the activities and power consumption in the plant since the power factor penalty was initiated in 1930.

Whether you use 1,000,000 kwh or more per month, as Gillette Rubber Company does, or only a few thousand, be sure you are not paying penalties of one kind or another — on low power factor, high maintenance, slow production, or any of the burdens caused by the wrong type of electrical equipment.

Your Westinghouse representative will gladly help you. You'll find there's a Westinghouse electrical wholesaler, industrial agent, or district office in every principal city.

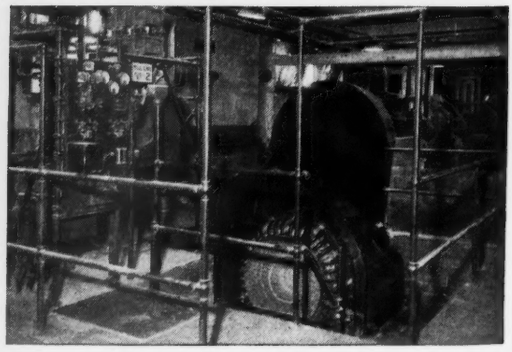
J-90212

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.



Left: Two typical drives on rubber machinery, using synchronous motors. In foreground, 125 hp motor, connected through a Westinghouse speed reducer to the mill and including manual reversing and dynamic braking. In background, 125 hp direct current motor, connected through a similar speed reducer to a strainer.

Below: Mill line drive, showing Westinghouse 250 hp synchronous motor, with motor rotor mounted directly on input shaft of a Westinghouse speed reducer, driving 3-section mill line roll.



Westinghouse

W
WESTINGHOUSE ELECTRIC

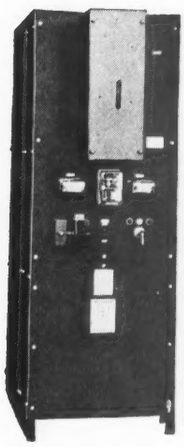
Westinghouse Money Savers

★ ★ ★

Improve power factor and cut power costs

SYNCHRONOUS MOTORS

Eliminate "idle power"—Westinghouse synchronous motors are efficient, save on power bills by correcting power factor, eliminating the wattless or "idle power." Westinghouse "definite time" feature makes starting easy. Low in first cost, too.



CAPACITORS

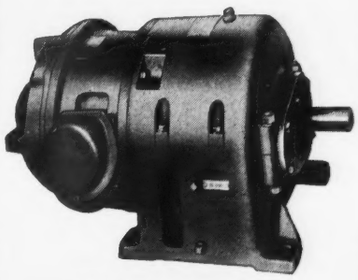
Reduce power bills — with Westinghouse capacitors. Improve power factor, reduce amount of current line must carry between capacitor and source of power, reduce line drop, circuit and transformer losses and effect better line regulation.

Reduce losses in power transmission

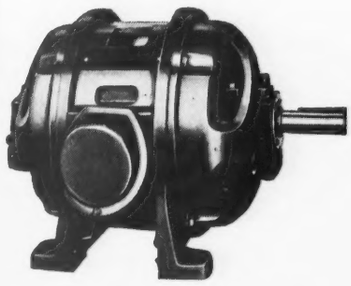
SPEED REDUCERS

Save power costs with Westinghouse speed reducers — which provide economical transmission of normally high speed motor or engine efficiencies, at the exact speed requirements of the driven machine. Features include hob cut single helical gear on shafts, less travel, lower impact stresses, BPT heat-treated gears.

Save on installation and power costs — with Westinghouse gearmotors. Exact horsepower and speed of driven machine, in one space-saving unit. More efficient power transmission — eliminating maintenance of belts, pulleys, chains and shafting. Delivers 96% to 98% of motor's efficiency.



GEARMOTORS



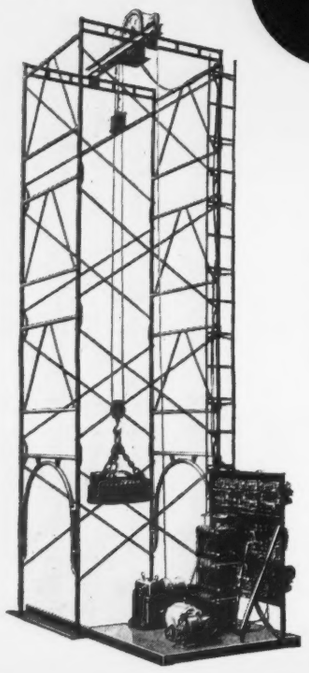
GENERAL PURPOSE MOTORS

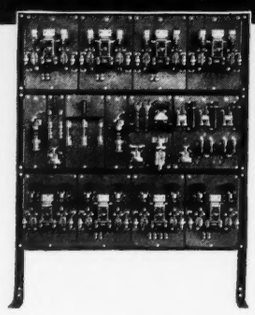
Save on maintenance — with Westinghouse general purpose a-c motors. Tuffernell insulation, sealed sleeve bearings, rigid, one-piece frame are features that enable these motors to deliver dependable performance for years, at exceptionally low upkeep and operating costs.

Motors and Control

EC&M Announces

DYNAMIC LOWERING CONTROL FOR A-C CRANE HOISTS





OPERATE YOUR A-C CRANES NOW

1. By dynamic braking
2. Without mechanical load-brake
3. By standard sequence of operation of Master Switch

and obtain

1. Precision inching
2. Elimination of load-brake maintenance
3. Simple master switch control—both lowering and hoisting motions start on first point of master
4. Increased crane output by lowering heavy loads at hyper-synchronous (150%) speed

At last—perfected crane control for A-C motor driven hoists, developed by EC&M, the originators, in 1912, of dynamic braking control for D-C cranes. Now—it is also possible to operate A-C cranes by dynamic braking, permitting low cost and precise operation. With this control, there is no mechanical load brake to wear and require attention; instead, the load is raised and lowered directly by the motor and control using A-C power only.

In inching operations, the short movements of the crane hook possible with this control will surprise you. And when lowering heavy over-hauling loads, the use of hyper-synchronous speeds (as much as 50% faster than previously obtained) will materially increase the output of a crane.

THE ELECTRIC CONTROLLER & MFG. CO.
CLEVELAND, OHIO

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The Electric Eye

In every industry progressive plant engineers are introducing
REAL ECONOMY—
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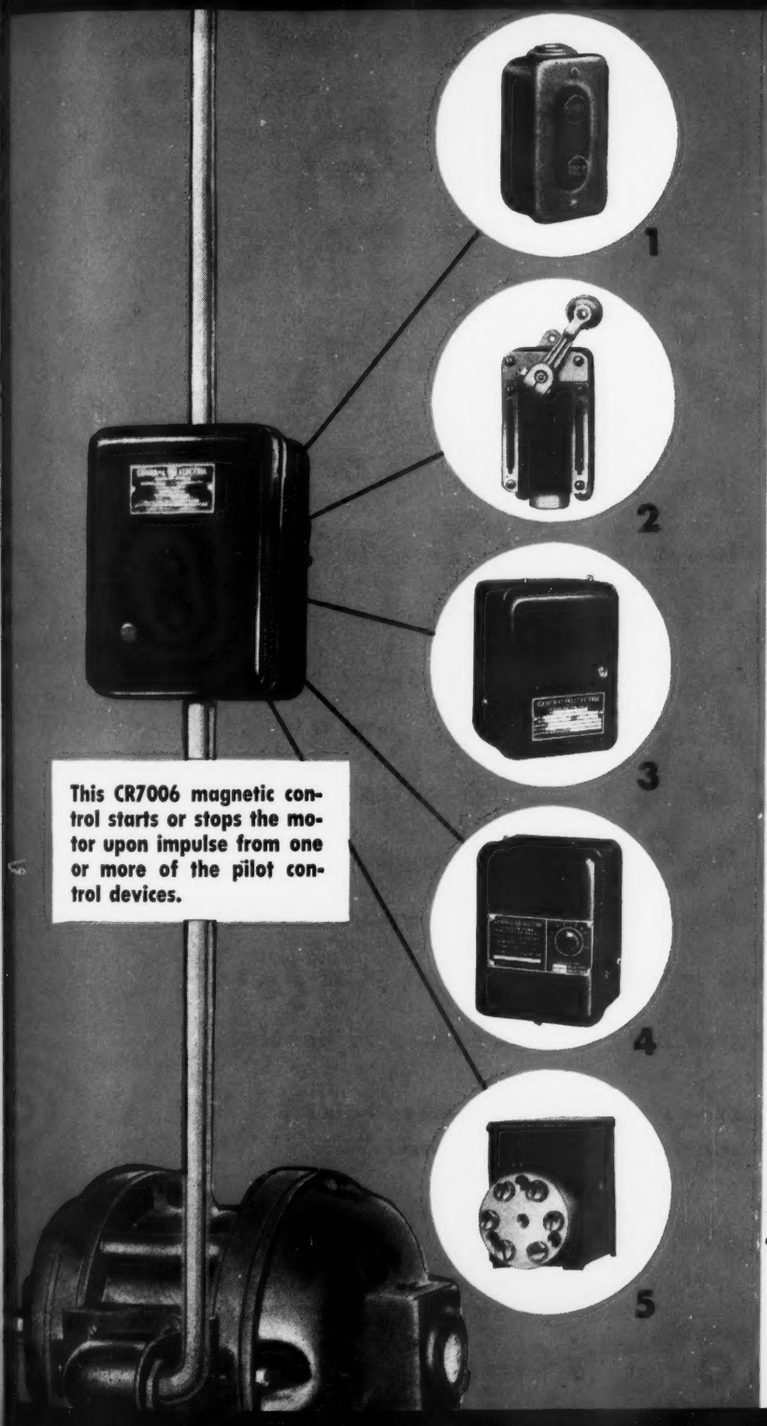
USE CONTROL

To Cut Manufacturing Cost



This CR7006 magnetic control starts or stops the motor upon impulse from one or more of the pilot control devices.

THERE'S nothing difficult about making manufacturing operations automatic. In many cases the correct motor plus properly selected G-E control will do the required job. Why G-E? — because General Electric offers *more different types* of control devices. The devices shown here are typical of the many efficiency-boosting G-E automatic controls.

1. Manual Push-button—By far the most widely used control, the finger-, palm-, or foot-operated push-button (CR2940) makes it possible to start a motor from one or more remote points—also supplements other pilot controls for manual operation.

2. Mechanical Limit—As a safety device to prevent overtravel, as an automatic means for stopping or reversing travel, or as a means of interlocking motions use a push-rod-, lever-, or gear-type limit switch (CR9440).

3. Light Beam—By far the most fascinating—and the most versatile—the photoelectric relay (CR7505) operates upon interruption of a light beam—opens doors, protects workers, acts as a limit switch, controls lights, etc.

4. Time-delay—Time plays a part in automatic control of motors. Wherever operations must be timed accurately or repeatedly, a vacuum-tube timer (CR7504) affords a dependable solution.

5. Pressure or Vacuum—Accurate pressure and vacuum switches (CR2927) offer control according to pressure of gas or liquid in a container.

Send for Bulletins

General Electric
Dept. 6C-201, Schenectady, N. Y.

Please send me publications which describe the pilot devices and controls shown above.

Name.....

Address.....

City..... State.....

080-196

GENERAL ELECTRIC

Electric Wires and Cables MUST *Stay in Service*

The wheels of industry are turning faster... electric wires and cables are carrying a vital responsibility. Power for even the smallest motors must not fail. Write "General Cable" into your specifications for plant extension wiring. The name "General Cable" represents not only vast manufacturing capacity but also the endorsement of a responsible manufacturer that your wires and cables will give long and dependable service.

FROM GENERATOR LEAD TO THE ULTIMATE POINT OF USE, SPECIFY "GENERAL CABLE" CONDUCTORS.

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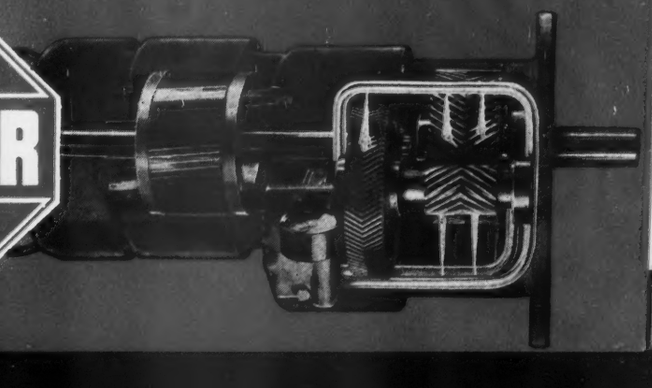
Another famous user of MASTER MOTORS

SHERWIN-WILLIAMS paints must be made from the best of materials and with the finest equipment to maintain their leadership in their field. Sherwin-Williams engineers have found that Master Motors built to meet the individual requirements of each job, add greatly to the compactness, economy, safety and convenience of their equipment. You, too, may secure these advantages. Investigate MASTER'S unusual ability to serve you promptly and economically, with motors that really fit YOUR needs.

THE MASTER ELECTRIC COMPANY • DAYTON, OHIO

MASTER

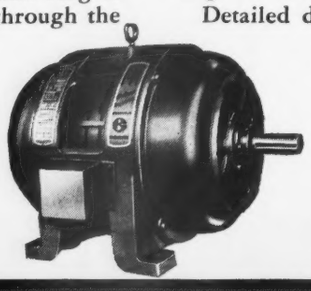


Fairbanks-Morse Is FIRST to Announce a Successful ONE-PIECE Rotor Winding Centrifugally Cast of Pure COPPER

Again Fairbanks-Morse leads the field with the most outstanding advance in motor design since we introduced the ball-bearing motor. Now comes the new COPPERSPUN rotor—a one-piece, squirrel-cage rotor winding, centrifugally *"cast en bloc" of pure copper!*

It took years of experimental work to perfect the process and the equipment which make this one-piece copper winding possible. Blanked laminations are stacked and held under pressure. During the casting process the entire assembly is spun at high speed. Molten copper is poured in at one end only. The opposite end ring is formed by copper that has passed through the rotor slots—giving assurance that it remained fluid during spinning.

The result is a truly one-piece copper winding with the most desirable characteristics obtainable: dense, ductile, uniform structure of high mechanical strength, high electrical conductivity, and low thermal expansion. Thus is provided a new degree of efficiency in motors for severe types of service where greater mechanical strength and ability to withstand high temperatures are becoming increasingly important.



After completion of centrifugal casting, the F-M Copperspun rotor is machine-finished over all surfaces and dynamically balanced to a high degree of accuracy.

Detailed data will not only prove intensely interesting—but is necessary information to those who profit by keeping abreast of electrical development. It will be sent upon request. Write Fairbanks, Morse & Co., Department 30, 600 S. Michigan Ave., Chicago, Ill. Branches and service stations throughout the United States and Canada.

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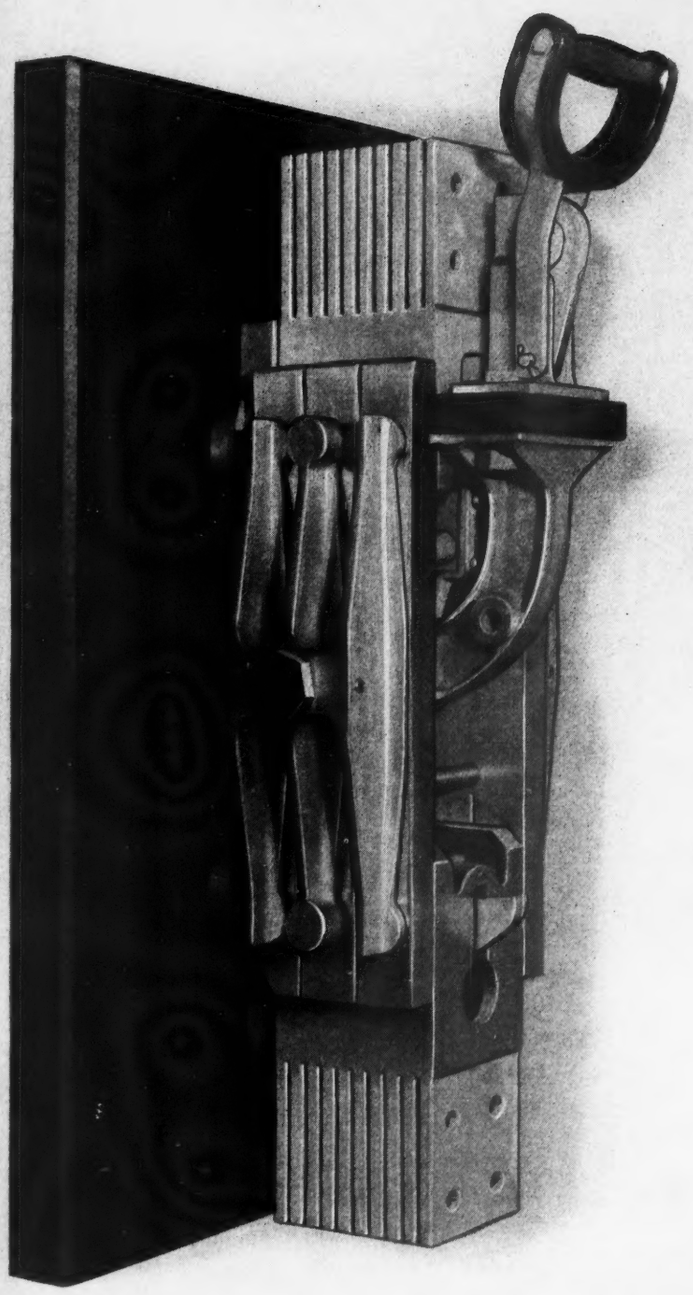
F M Motors

Safe, *Maintenance Free* Switches



KLAMP-TITES

By doing away with high maintenance costs and by minimizing current losses at all periods in their extremely long service life, I-T-E KLAMP-TITES are replacing conventional knife switches in many industrial and public utility plants.

Industry has needed a switch like the KLAMP-TITE for its safety. Operators welcome it for the ease with which it is opened or closed. But actual, measurable savings in expense are important factors in decisions to replace common knife switches with KLAMP-TITES.

Tight Contacts

A built-in clamping feature allows the closed switch to hold as securely as a bolted joint.

Current-free Mechanical Pressure

Heavy bars outside of all current carrying circuits maintain enormous contact pressures indefinitely.

Constant Millivolt Drop

Current passes through the contacts with almost no loss. An original low millivolt drop remains low after years of use.

Easier to Operate

Contacts that are held closed under high pressures are opened and closed with entire freedom from galling friction.

Safe to Use

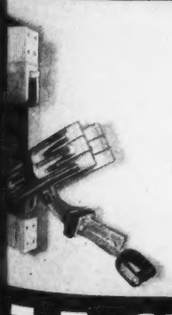
The handle is outside the dangerous arcing zone in all stages of opening and closing. The Klamp-Tite is a safer switch.

KLAMP-TITES are available in single and multipole standard types, indoor and outdoor, for hand or hook-stick operation. Capacity from 600 amperes upward in a wide voltage range. All contacts are silvered.

Engineering data is available, or can readily be prepared, for any style desired above 600 amperes rating. Bulletin 238, illustrating eight representative styles, will be sent on request.

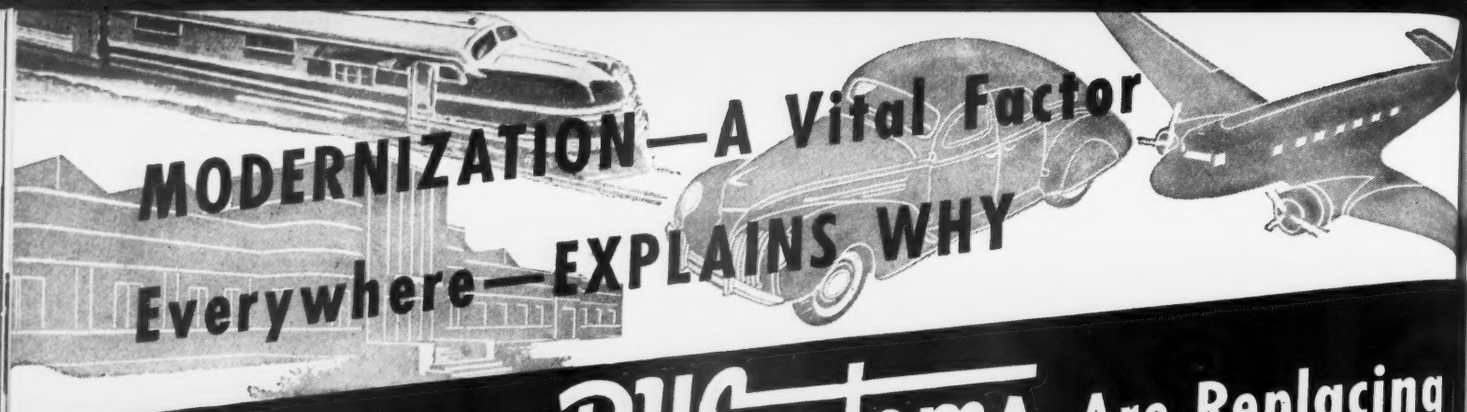
Representatives in Principal Cities

ONE THROW OF HANDLE . . .



. . . opens or closes a KLAMP-TITE switch. In closed position (above) blades are bearing down on terminals with thousands of pounds constant pressure. In mid-position (right) clamping pressure is released. In the full stroke to the open position (left), the operator's hand is outside the arcing zone.

I-T-E CIRCUIT BREAKER CO., PHILADELPHIA, PA.



MODERNIZATION—A Vital Factor Everywhere—EXPLAINS WHY

BULL DOG BUSystems Are Replacing Old-Fashioned Methods of Electrical Distribution

BULL DOG Trol-E-Duct FOR LIGHT

TROL-E-DUCT—every inch of which is a potential electrical outlet—will give you a Modern Lighting System that can be kept Modern and Adequate, regardless of future plant expansions or changes in plant layout. With TROL-E-DUCT you can have Lights WHERE you need them, WHEN you need them . . . and as finer types of Luminaires are designed you can readily adopt them in your Plant without delay and without the expense of re-wiring. With TROL-E-DUCT installed in your Plant you are assured a Lighting System that will be Adequate and Modern—ALWAYS.

BULL DOG BUStribution FOR POWER

BUStribution gives your Plant a complete FLEXIBLE system o Power Circuits. Convenience Outlets, spaced every 12 inches a the Duct run, enable you to "plug-in" Branch Circuit Protectiv Devices, of any type, at points most convenient to motors an machines . . . and these circuit protective "Plugs" are readi removable to new locations to meet changes in Department a Plant layouts. The "125 AMP. TYPE" puts this flexible distribu tion system within the reach of smallest shop or individua plant department. With BUStribution installed in your Plant yo are assured a Power Distribution System that is always—MODER

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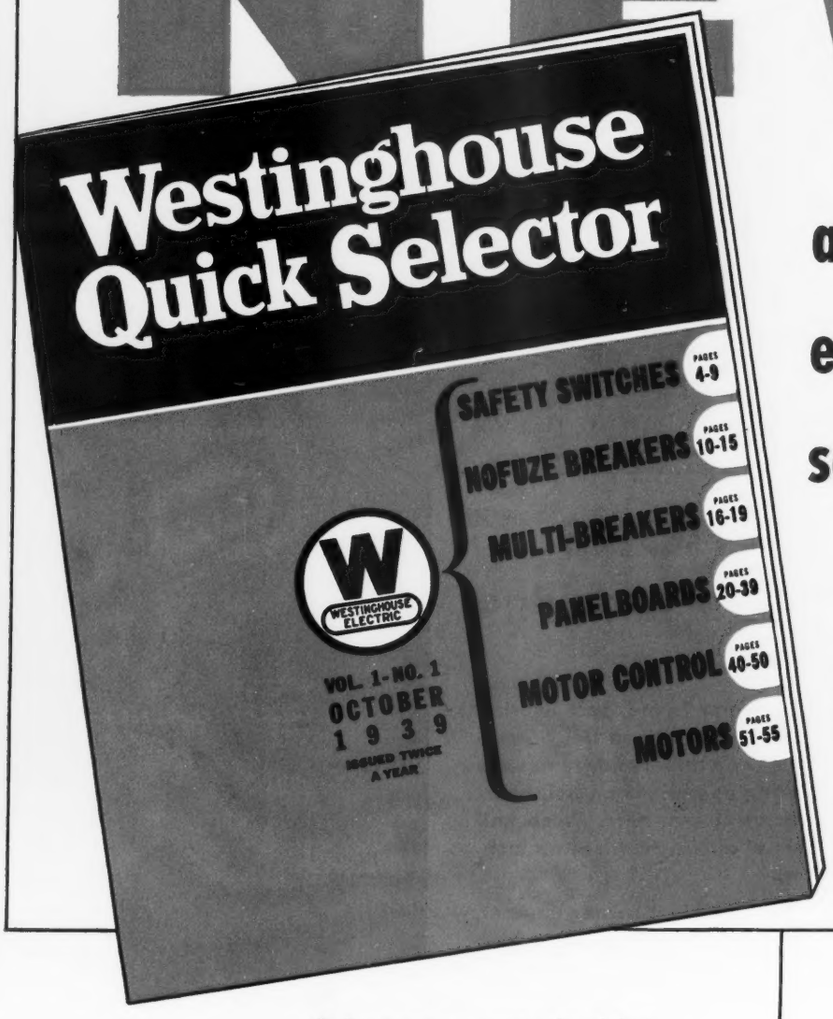

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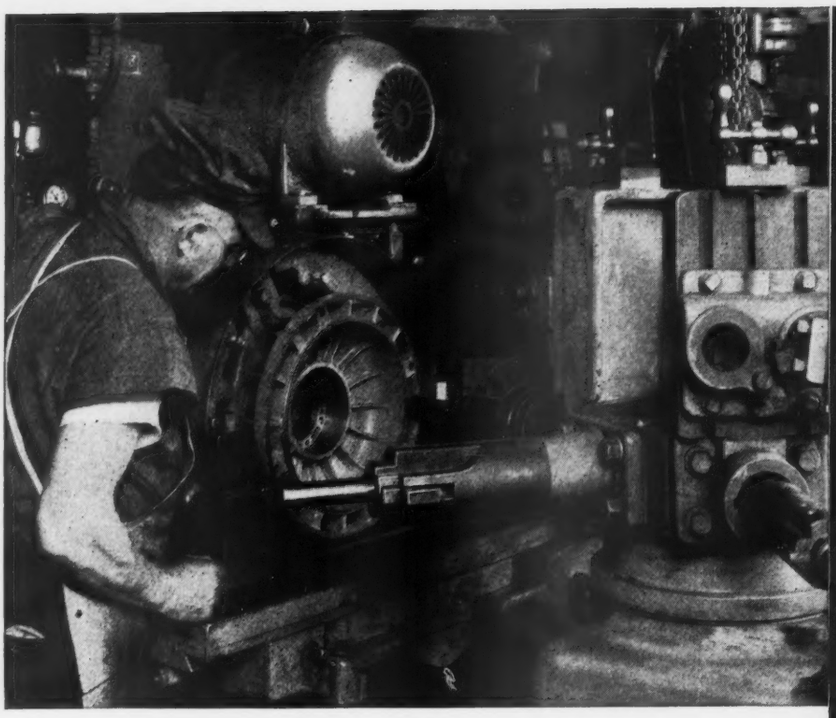
WESTINGHOUSE ELECTRIC

Westinghouse



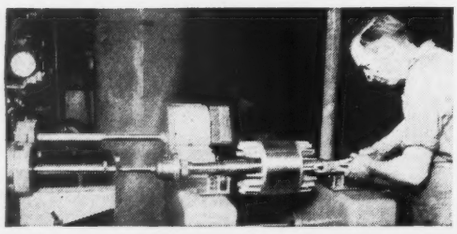
FRIENDLY RELATIONS

End frame—ball bearing cartridge —ball bearing

Accurate machined surface relation between end frame, ball bearing cartridge and ball bearing is accomplished by the common Delco practice of grouping operations. Turning operations on motor end frames are done in one operation, and turning and boring operations on ball bearing cartridges are completed in one setup, as shown here. Delco ball bearing cartridges are machined to the tenth of a thousandth of an inch, to insure the proper fit of a selected bearing.

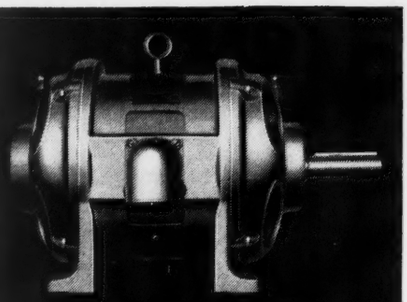
On sleeve bearing types, the end frame is machined in the same manner, and the oil reservoir is thoroughly cleaned and lacquer-sealed at high pressure. After the babbitt-lined bearing is pressed into place, it is diamond-bored to very close limits, insuring an inside diameter concentric with the register on the end frame.

Delco urges prospective motor purchasers to consider what this precision workmanship means to their lasting satisfaction, and to *look within* the motors they specify.

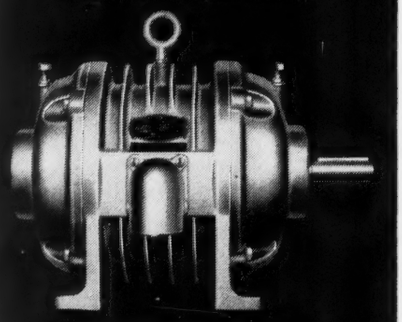


EVERY DELCO MOTOR IS DYNAMICALLY BALANCED

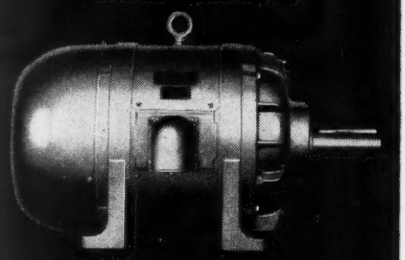
No motor leaves Delco Products that has not been dynamically balanced on a specially-designed balancing machine. Delco balances every motor. Each end of the rotor and shaft is first balanced independently, while the machine indicates exactly how much compensation is required and where it should be applied. After all adjustments have been made, the complete rotating assembly is given a final check. Delco motors assure satisfactory balance.



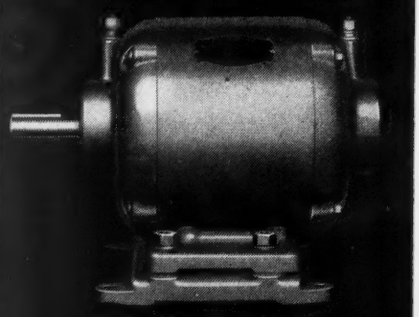
Open Frame, Sleeve or Ball Bearing



Totally Enclosed Ball Bearing



Totally Enclosed Fan-Cooled Ball Bearing



Fractional Horsepower Motor

• • •

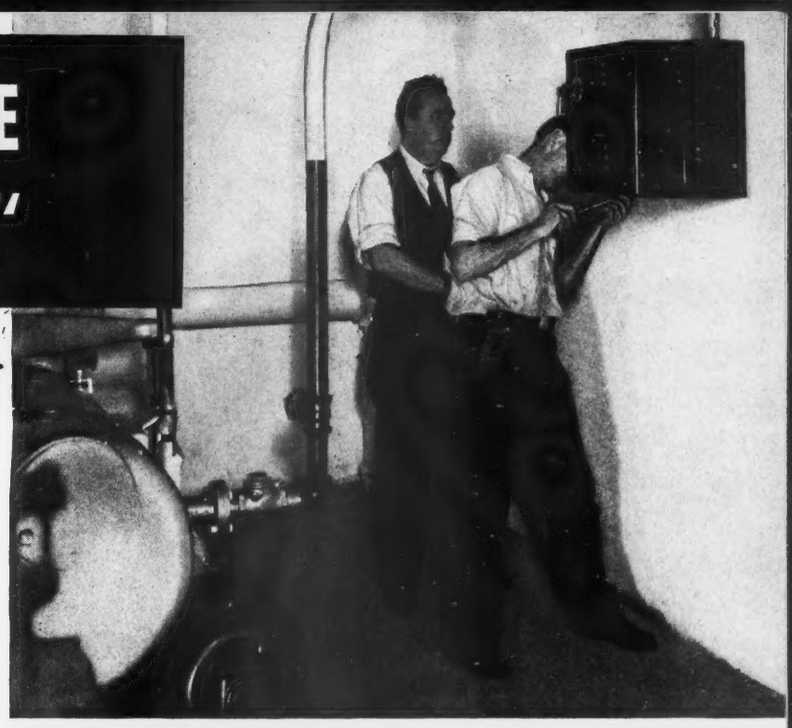
Delco industrial AC motors are available in various types, possessing electrical and mechanical characteristics to meet practically every requirement.

Normal starting torque—normal starting current—high starting torque—low starting current—as well as high slip. Each type available in open frame, sleeve or ball bearing—totally enclosed ball bearing—totally enclosed fan-cooled ball bearing—also multi-speed motors. Electrical and mechanical modifications available. Delco motors comply with NEMA standards.

DELCO MOTORS

DIVISION OF GENERAL DELCO PRODUCTS DAYTON, OHIO MOTORS CORPORATION

HE REALIZES THE IMPORTANCE OF "IC"

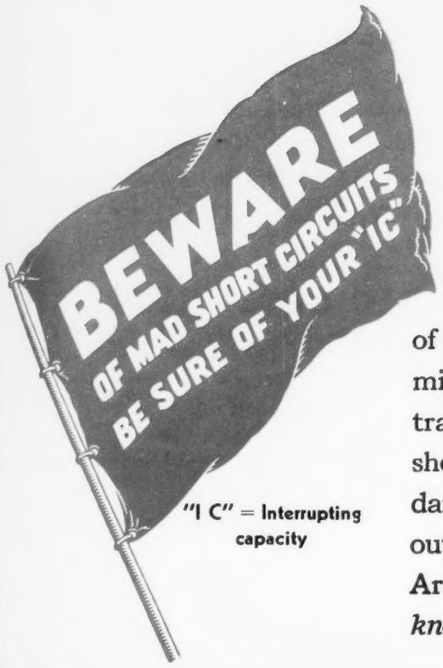


That's Why He's Installing G-E Air Circuit Breakers on All Branch Circuits

BESIDES adequate interrupting capacity ("I C"), G-E air circuit breakers provide overcurrent protection, with adjustable time delay. And you can restore service at once, safely, just by turning a handle. By providing three-phase interruption, single-phasing of motors, with all its harmful effects, is prevented. Because of their trip-free action, these circuit breakers cannot be held closed against short circuits. They are designed for interrupting ratings up to 80,000 amp.

For Main Circuits He Bought G-E Air Circuit Breakers Assembled as a Completely Enclosed Switchboard

This assembly of G-E air circuit breakers is installed as a unit. All you need do is to connect the leads. Being completely dead-front, it offers the advantage of safety over old-fashioned boards that have exposed live parts.



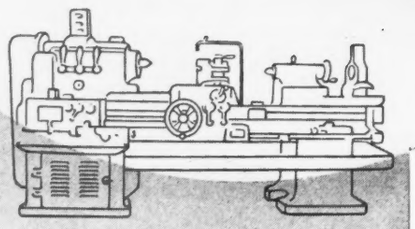
THE severity of a short circuit depends largely on the capacity of the transformers that feed the circuits and it can *not* be determined by the normal load on the circuit. As plant loads have grown, transformer capacities have been materially increased. Therefore, short circuits present an ever-increasing hazard. They gravely endanger personnel and property wherever the power supply has outgrown the interrupting capacity ("I C") of the protective devices. Are you sure of your "I C"? With G-E air circuit breakers of *known* interrupting capacity, you *can* be sure.

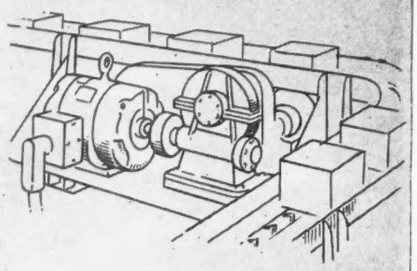
GENERAL ELECTRIC

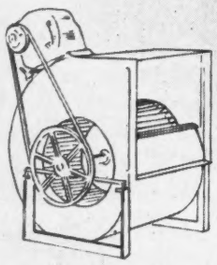
890-80

Century 4-Speed SC MOTORS with 2-Speed Gear

Increase Production Efficiency, Lower Operating Costs Allow Better Precision Work!







Century Motor Specialization
+Correctly Engineered Application
= Satisfaction and Economy

CENTURY 4-Speed Squirrel Cage Induction Motors with 2-Speed Gear provides the flexibility of 8 speeds. The motor itself provides four predetermined speeds, automatically or push button controlled, the 2-speed gear doubles the motor speeds available.

Such speed changes result in definite operating advantages and production economies. When applied to machine tools they make possible a greater number of cutting speeds — varying with tools and size of materials. The remarkable freedom from vibration of Century Motors also greatly aids machine tool accuracy by reducing surface waves on the work.

To add greater flexibility with more accurate production control at lower cost, specify Century 4-Speed Squirrel Cage Induction Gear Motors. They are available in wide or narrow speed ranges—open or splash proof types—in sizes up to 200 h. p.

Find out today how Century "Specified Motor Performance" accurately assures in advance the type of performance each motor installation will deliver. Your nearest Century Motor Specialist will gladly give you full information. He's always at your service — call him in.

CENTURY ELECTRIC COMPANY
1806 Pine Street St. Louis, Mo.

Offices and Stock Points in Principal Cities
Atlanta • Baltimore • Boston • Buffalo • Chicago • Cincinnati • Cleveland
Dallas • Davenport • Denver • Detroit • Houston • Indianapolis • Kalamazoo
Kansas City • Los Angeles • Milwaukee • Minneapolis • New Orleans
New York • Omaha • Philadelphia • Pittsburgh • Rochester • Salt Lake City
San Francisco • Seattle • Spokane • Tulsa

Century MOTORS

One of the Largest Exclusive Motor Manufacturers in the World

Advertisements for this section continued on page 304

Section 4 FACTORY'S Catalog Service

Electrical Transmission and Utilization

1 **A.C. Motor**—A four-page illustrated bulletin (GEA-712E), contains information on the operating characteristics, ratings, induction features and application of the General Electric Type BTA adjustable speed alternating current motors in sizes of 3 horsepower and larger. **General Electric Co.**

2 **Air Circuit Breakers**—This new 16-page bulletin (GEA-2634) explains why interrupting capacity ("IC") should be an important consideration when purchasing protective equipment for main and branch-feeder circuits. It shows how G-E air breakers with adequate "IC" help eliminate these hazards of severe short circuits—injury to personnel, damaged equipment, and costly shutdowns. **General Electric Co.**

3 **Air Circuit Breakers** — Bulletin B2185 describes the complete new line of air circuit breakers of the type DA "De-ion." Describes and illustrates complete line as well as accessories and attachments. For use on a-c circuits up to 600 volts and d-c circuits up to 750 volts. Interrupting capacities from 15 to 10,000 amperes and from 10,000 to 80,000 amperes. **Westinghouse Electric & Mfg. Co.**

4 **Automatic Motor Control**—Attractive booklet 88 illustrates and describes a line of automatic motor control equipment for a wide variety of applications and types of motors. Describes equipment designed to meet definite problems, as well as facilities for building equipment to individual specifications. **The Electric Controller & Mfg. Co.**

5 **Bustribution**—24-page bulletin describing a flexible system of power circuits. Consists of inter-connected sections of Duct in which Busbars are mounted and into which Branch Circuit Protective Devices may be "plugged" at points most convenient to motors or machines controlled. Plugs are readily removable to meet changes in layouts. **Bull Dog Electric Products Co.**

6 **Clamp-Ammeter**—Well illustrated booklet, A-2-B, describes a new clamp-ammeter which permits the measurement of alternating current without breaking the circuit. Shows range of capacities and prices. **Weston Electrical Instrument Corp.**

7 **Explosion-Proof Motors** — Bulletin 1225 describes the new line of explosion-proof ball-bearing motors approved by Underwriters Laboratories for Class 1, Group D hazardous locations. Designed to insure against accidental ignition or explosion of vapors or gases prevalent in plants producing or employing gasoline, acetone alcohol, volatile or combustible gases. Fully describes the construction features of this new line of motors. **Fairbanks, Morse & Co.**

8 **Fuses**—Catalog No. 300 illustrates and describes a complete line of renewable and non-renewable fuses as well as plug clamps, fuse pullers and other accessories. Shows sizes, capacities and prices. **Trico Fuse Mfg. Co.**

FACTORY, through the cooperation of leading manufacturers, makes it possible for you to secure catalogs, bulletins, and booklets listed here without cost or obligation. Check and fill out the coupon below and send it to FACTORY. See other sections for additional catalog listings.

9 **Heatproof and Flameproof Wires, Cables and Cords**—The new No. 10-E Catalog contains detailed and useful information on characteristics, tests, specifications and applications. Illustrates a complete line of asbestos insulated wires, cables and cords designed and constructed to resist heat and moisture, oil, grease and corrosive fumes. **Rockbestos Products Corp.**

10 **Lo-Maintenance Motors**—28-page booklet, B6029, describes a complete line of motors for all types of plant operations. Bulletin also describes "Texrope" drives for fixed and variable speed applications. Well illustrated with photographs and engineering diagrams and complete performance and application data. **Allis-Chalmers Mfg. Co.**

11 **Motor Starter**—A new pictorial presentation of the size 0 starter for motors up to 2 horsepower (GEA-3250), which shows points to look for in magnetic control for small motors. The bulletin describes new overload relays—and offers a new way to control small motors more economically. **General Electric Co.**

12 **Renewable Fuses**—A book on "How to Select Renewable Fuses." A concisely written treatise that shows the importance of fuse design in the elimination of useless shutdowns caused by needless blowing. Illustrated to show comparison and features of various types of fuse construction. **Bussmann Mfg. Co.**

13 **Repulsion Start Induction Motor**—Attractive booklet, 938A, describes a line of repulsion start induction, brush lifting, single phase motors. Well illustrated and contains complete data on starting torque and current for various types of motors, as well as detailed construction drawings and illustrations. **Century Electric Co.**

14 **Signal Devices**—Series of bulletins No. 1238 describes a line of signaling equipment including indicating lamps for all types of panels, remote control systems and automatic controls as well as recess lamp receptacles for neon and tungsten lamp bulbs. Also describes breakglass switches and signal lamp bulbs and resistors. **H. R. Kirkland Co.**

15 **Switches and Starters**—Three bulletins containing valuable information on switching equipment. Bulletin 100 describes push-button for heavy-duty service; bulletin 102 describes the "hatchway" limit switches, and bulletin 101 describes the torque-operated heavy-duty master switches. All bulletins are well illustrated and provide helpful operating information on the use of equipment. **The Clark Controller Co.**

16 **The Electric Eye in Industry**—A booklet describing many applications of the photoelectric control in various industries. Illustrated **Photoswitch Inc.**

17 **Universal Trol-E-Duct** — 12-page bulletin describing a Flexible Electrical Distribution System for Lighting. Every inch of Trol-E-Duct is a potential electrical outlet. By using Trolleys or Plugs, lighting units of any type can be quickly moved from one point to another or new units added at anv particular spot desired. **Bull Dog Electric Products Co.**

18 **Wound Rotor Induction Motors**—Bulletin 159-A describes a complete line of wound rotor induction motors with capacity ratings from 1 to 15 hp., 20 to 75 hp., and over 100 hp. Bulletin illustrates the various features of construction and describes the different types of frames available. Motors are described with both constant and adjustable-varying-speed characteristics. **General Electric Co.**

Use the coupon to Secure Valuable Manufacturers' Literature

Section 4 MAILING COUPON—NOVEMBER 1939—Good Until February 28, 1940

FACTORY MANAGEMENT & MAINTENANCE
330 West 42nd Street
New York, N. Y.

Please have the manufacturers send me, without obligation, the literature circled below. (Numbers correspond to descriptive paragraph numbers.)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18		

Name..... Title.....

Company.....

Street Address.....

City..... State.....

Please fill out this coupon completely in order to avoid delay in handling.

Top-Quality JENKINS iron VALVES *mean extra savings!*

CHECK the features in the diagram below and you'll see the sound valve engineering behind this Jenkins Fig. 624, 125 lb. Regrinding Swing Check Valve.

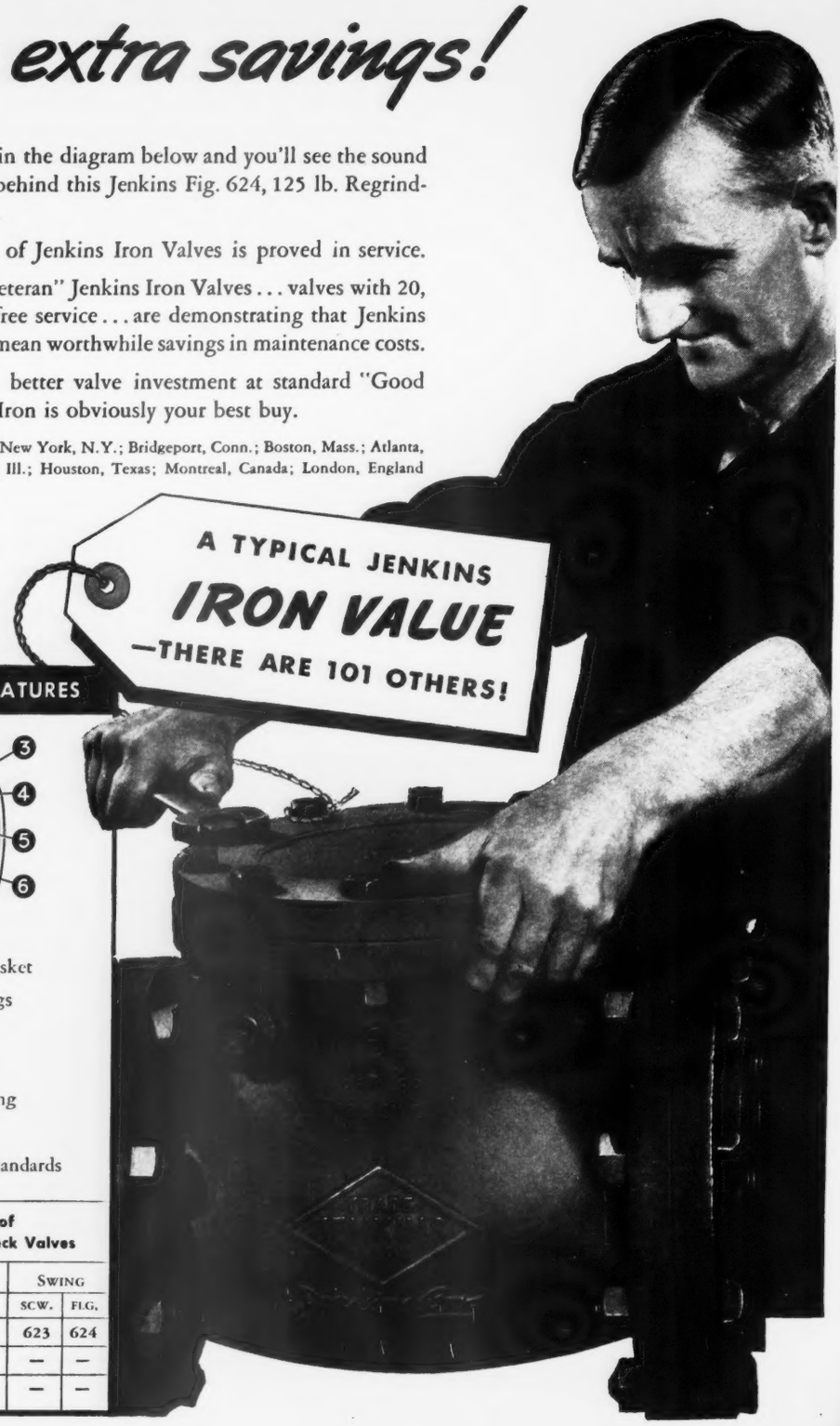
But the real superiority of Jenkins Iron Valves is proved in service.

Throughout industry, "veteran" Jenkins Iron Valves . . . valves with 20, 30, 40 years of trouble-free service . . . are demonstrating that Jenkins design and construction mean worthwhile savings in maintenance costs.

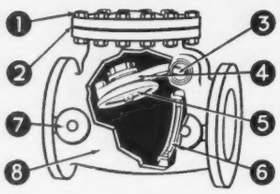
And when you get this better valve investment at standard "Good Valve Prices"—Jenkins Iron is obviously your best buy.

JENKINS BROS., 80 White St., New York, N.Y.; Bridgeport, Conn.; Boston, Mass.; Atlanta, Ga.; Philadelphia, Pa.; Chicago, Ill.; Houston, Texas; Montreal, Canada; London, England

1864 JENKINS TRADE MARK 1939
Jenkins Bros
DIAMOND ANNIVERSARY



8 SERVICE-PROVED FEATURES



1 Rugged Through-Bolts
2 High Pressure Asbestos Gasket
3 Machined Bronze Side Plugs
4 Sturdy Hanger Assembly
5 Heavy Duty Bronze Disc
6 Renewable Bronze Seat Ring
7 Convenient Bosses
8 IRON *Exceeds* A.S.T.M. Standards

Guide to Figure Numbers of Jenkins Iron Body Regrinding Check Valves

STEAM PRESSURE	HORIZ. LIFT		ANGLE LIFT		SWING	
	SCW.	FLG.	SCW.	FLG.	SCW.	FLG.
125 Lbs.	617	618	619	620	623	624
150 Lbs.	928	929	930	931	—	—
250 Lbs.	934	935	936	937	—	—

Buildings, Services, and Maintenance

in the cost-reducing program

EVEN DURING THE DEPRESSION YEARS manufacturing industry has invested annually an average of several hundred million dollars in its buildings.

This investment is constantly under the attack of nature's destructive forces. It is subjected to the wear and tear of usage. Nothing that man can do can entirely stop their action.

But destruction can be retarded. Wear- and corrosion-resistant materials can be used in construction. Surfaces can be protected. Periodic inspection procedure can be instituted. Preventive maintenance can be practiced.

These steps are indicative of the vigilance that must be exercised to protect industry's enormous investment in buildings, in the interest of low-cost production.

Services go along with buildings. Even the routine of industrial living is not possible without adequate services for people—in the way of protection, sanitation, and comfort.

Nor can production equipment be operated without supporting services—heat, water, gas, and air.

Costs of production go down in proportion to the effectiveness of services for people and for equipment.

WHAT TO DO

SUGGESTIONS THAT POINT THE WAY

Check condition of roofs, floors, and other elements. If repair costs are excessive, condition bad, or deterioration rapid, consider the advisability of replacing old roofs, floors, etc., with more suitable types.

Make sure that sanitary facilities are adequate and conveniently located so as to avoid unnecessary waste of employees' time.

Study consumption of water, to minimize waste. Consider feasibility of re-using water employed for cooling or other services.

Determine need for repairs on air compressors. Stop leaks in pipe lines and valves. Study use of air, looking toward substitution of low-pressure or blower air for high-pressure air.

Check firefighting equipment for condition, adequacy, and type.

Study needs for plant communication and signaling facilities.

Investigate cost of plant cleaning methods and equipment.

Check adequacy of watchman service in protecting plant against fire and theft. See that fencing is adequate as to amount and condition.

Study organization of maintenance department, to make sure its work is handled with maximum efficiency.

BUILD FOR PERMANENCE—but KEEP RELOCATION IN MIND

ASBESTOS-CEMENT in composition, Transite Walls cannot burn, rot or decay. Their unusual strength and durability protect against cracking, chipping or denting. Repairs or replacements are seldom required.

Permanent, movable plant offices are easily built with J-M Transite Walls··· are just as easily relocated without loss of material···

YOU get all the best features of both fixed and movable partitions when you build with J-M Transite Walls.

Made of asbestos and cement, this tough material is fireproof and rotproof, will not chip or crack . . . needs little or no maintenance. Transite Walls offer unusual resistance to sound-transmission . . . provide the same solidity and privacy as fixed walls. A simple, dry construction method saves time, labor and materials at installation. Whenever changes are necessary, this same method assures rapid, economical relocation with 100% salvage of materials.

May we send you complete details? Ask for brochure TR-19A. Johns-Manville, 22 E. 40th St., New York, N. Y.

EASY TO INSTALL, Transite Walls are just as easily relocated. A unique construction method does away with the usual dirt and disturbance. The original partitions can be relocated time and again without loss of materials.

Johns-Manville TRANSITE WALLS

Cuts Heat Transfer 78%

Heat and glare from the sun were cut through the use of treated actinic glass

Use of treated actinic glass solved the problem of reducing glare and heat from the sun, at the Inland Manufacturing Division of General Motors Corporation, Dayton, Ohio.

Trouble arose when it became necessary to install offices in a building that had been designed for manufacturing purposes. The sash is of the projected factory type, the two upper ventilating sections being equipped with manual gang controls comprising a worm and quadrant on continuous sash operators. Because it was thought that the offices would be used only temporarily no changes were made in the sash.

With a southern exposure and a large expanse of glass, heat and glare were troublesome. Venetian blinds were impracticable because the sash operators extend about 15 inches.

As an experiment, untreated actinic glass was installed in one bay. This produced definite, although not entirely satisfactory results. The manufacturer of the glass then furnished another sample which had been treated to make it remove more of the glare and heat, but at the same time permit satisfactory transmission of daylight.

This glass has been found to be very satisfactory. It eliminates 60 per cent of the glare and has reduced heat transfer 78 per cent.

Provides Fire-Resistant Floor in Spray Booths

Construction of spray booths in one plant was complicated by the fact that the existing floor is of wood. Due to the highly flammable qualities of certain lacquers and enamels used, it was necessary that the booths be absolutely fire-resisting and constructed of materials approved by the Fire Underwriters.

Tests of floor coverings and surfacing materials led to the adoption of one which can be placed over wood to provide resistance to fire as well as a durable wearing surface. Applied in a comparatively thin layer, it adds very little height to the existing floor, and was feather-edged to prevent any bumping or jarring of the work as it is trucked out of the booth.

Although subjected to constant traffic it is considered that this material has given better service than would have been obtained from a wood or even a concrete surface.

Saves with Portable Tools

Use of portable electric tools enabled a manufacturer of unit heaters to make a considerable reduction in the cost of installing his equipment in local customers' plants.

For many years it had been the practice for the installers to determine where and how to mount the unit heaters in the customer's plant and go back to their own shop to drill and tap holes in the mounting brackets. Another trip was then required to install the heaters.

To eliminate this obvious waste of time and manpower, each installer was provided with a portable electric drill and a tapper. Now all drilling and tapping is done on the job and only one trip to the customer's plant is necessary.

The saving in the cost of installing the heaters has been so great that the men are now being provided with portable electric screwdrivers, as a means of reducing costs still further.

*Turns Walking Time to Working Time

Much checking is necessary between the main warehouse office where the superintendent, bookkeepers, and files are located, and the warehouse foreman and shipping and receiving clerk. Although there are phone extensions, a lot of running back and forth used to be necessary. By the installation of an interoffice communicating system, whereby each can call the other at will, such walking time is now working time. *H. Wilson*, Purchasing Agent, Carolina Power & Light Company, Raleigh, N. C.

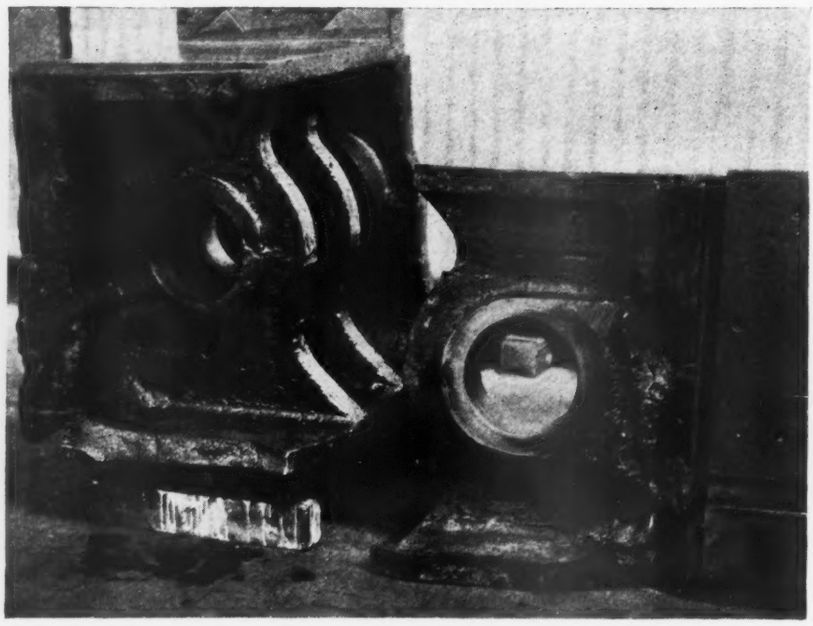
*No Samples Wanted

The maintenance and equipment division of a large industrial plant where I was task engineer, received approximately 1,000 work orders monthly from the superintendents of the various divisions. These work orders varied from one requesting a bolt to one requesting overhaul of a locomotive. Many of them were worded simply "Please make one gear as per sample" or "Make one valve as per instructions."

Since we had to set a task-and-bonus rate on each work order, my department would have required a crystal gazer on its staff to set rates on the "as per instructions" work orders.

The "as per sample" orders had several disadvantages, too. One of these was that the sample in most cases was a worn part, and if we made a machine part "as per sample" the new part would be no better than the worn one. Another disadvantage of the sample method was that pieces weighing many tons had to be brought in.

One morning a work order landed in



Welding this broken 5-ton casting cost $120, but it saved an $1,800 investment

my office, signed by the master mechanic, which read: "Please make one gear as per sample." I went to the machine shop to look at the sample. It was a great big gear from an 8 cu.yd. shovel, and was being unloaded from a flat car with a locomotive crane and bull gang of eight men, under the supervision of the master mechanic.

The worn gear was covered with grease and dust, and so was the bull gang. It took them 4 hours to remove the gear and take it to the machine shop. At the rate of $65 per hour for a locomotive crane, the cost of showing this sample was $260. Then the draftsman had to make a drawing of it anyway for pattern making and machining.

In order to eliminate these expensive handling jobs I requested the chief engineer to issue orders that no more "as per sample" or "as per instructions" work orders would be accepted. All instructions would have to be written on the work orders, and instead of samples, sketches or blueprints would have to be furnished with the work orders. A great deal of confusion, errors, and expense was eliminated this way.—*James Winston*, Production Manager, Valley Engineering Company, San Bernardino, Calif.

✦

To clean 3,300 square feet of concrete floor, 4 men took 7 hours, used 100 pounds of soap powder. Now, with a concentrated cleaner, 2 men do it in 3½ hours. Saving, 66%.

"Couldn't Be Done"—But Arc Welding Did It

When the 5-ton casting for an upsetting machine broke in two pieces during operation, plant operating officials at National Supply Company, Toledo, considered it beyond repair. They decided, however, to try to arc-weld it—and succeeded, saving $1,800 replacement cost and 5 weeks' outage time.

Total welding time was 70 hours. One weld was 6 inches thick, 30 long; two welds were 2½ inches thick, 24 long. Skillful handling of the work kept alignment of parts within 0.01 inch. Total cost was $120.

*Venetian Blinds Pay Out in 2 Years

Forty awnings on the third and fourth floors of a mill-type building—space used as a factory office—necessitated the use of a swing stage in putting these awnings up in the spring and removing them in the fall.

The awnings were replaced with Venetian blinds. Savings in the cost of labor and overhead for installing and removing the awnings will pay for the blinds in two years. It is estimated that the annual maintenance cost of the blinds will be less than half that of the awnings and shades previously used.

In addition to the lower cost, the appearance of the building is improved, the office is lighter, and the safety hazard coincident with the use of a swing stage has been removed.—*John H. Stoutenberg*, The Stanley Works, New Britain, Conn.

*Saves by Recording Replacements

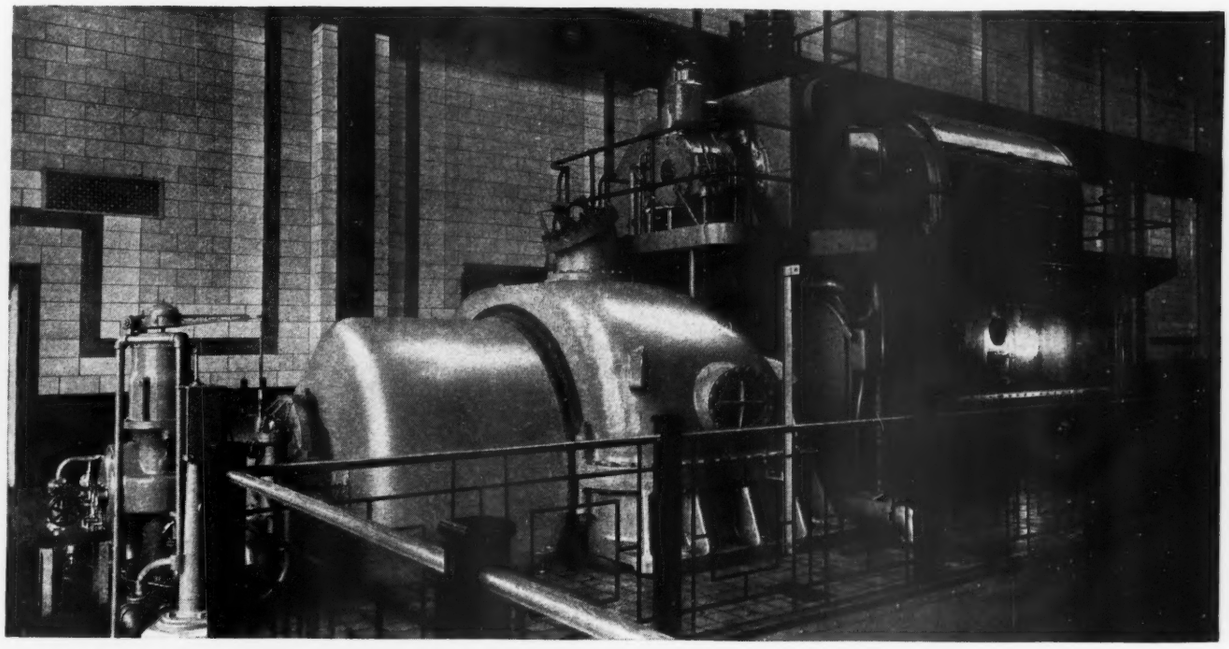
Experience has taught our organization that the only sure way of eliminating thousands of dollars' loss either from unnecessary replacements or too-long-delayed replacements is to record in a perpetual file every major replacement and guarantee pertaining thereto.

At the time of replacement, notations describing the replacement are made for future reference. Hours operated since the last similar replacement are recorded; who made the replacement in this particular instance, as well as the previous installation; exactly why the replacement was necessary; any recommendations of merit having to do with alterations in materials, method of installation, or operating conditions.

In addition to the foregoing record, a tickler system is in effect, insuring follow-up inspections of the machinery. These follow-up inspections are made a

PAYS OUT IN 3 YEARS

In a watch factory where a very high standard of cleanliness is necessary it was found that a total area of 180,000 square feet could be cleaned immaculately every night at an average rate of 4,300 square feet per hour with a central vacuum cleaning system. The saving in cleaning time over the method formerly used will enable this company to write off the original investment in less than three years



Carbon dioxide fire-protection system on this condenser went into action recently, stopped a potential loss of $20,000

reasonable period of time before a breakdown may be expected, thereby keeping our inventories at a minimum as well as aiding materially so far as our budgetary control system is concerned.

In the case of guarantees, a record is kept showing the trade name of the product, the name of the producer as well as that of the seller, the date bought or contracted for, delivery or installation date, period and condition of the guarantee, and any peculiarities that we have noticed about the item in the past. When this record has been made, an inspection is scheduled for the future, on a date that will permit reinspection, if necessary, before expiration of the guarantee, and yet insure continuous service until replacement is made.—*Claire Wilcox*, Efficiency Man, Potlatch Forests, Inc., Lewiston, Idaho.

Switched Soaps, Saves

Former practice in a metalworking plant having 500 employees was to buy liquid soap in barrels at a cost of $1.25 per gallon. With a consumption of 7 gallons, the cost of the soap was about $8.75 per week.

Changing to the use of powdered soap reduced this cost considerably. The soap is used in liquid form, produced by adding water to a dispensing drum containing the powdered material. As the soap solution is drawn off, more water is added until the powder is all dissolved. The soap solution as drawn off is mixed half and half with water to give a liquid soap having about the same consistency as that which was formerly purchased.

The cost of the soap now amounts to 23 cents per gallon, representing a saving of $1.02 per gallon over the cost of the liquid soap formerly used.

Fire Control Saves $20,000

Recently a bolt broke from the field coil strap on the rotating field of a large, high-voltage synchronous condenser and got into the stator windings, short-circuiting two coils. There was an instant flash of fire; then the automatic relays cleared the machine and operated the carbon dioxide system with which it was protected. The cooling system was immediately flooded with the inert, extinguishing gas.

Inspection revealed that the carbon dioxide had confined the fire damage to the two coils originally injured by the loose bolt and that the damage amounted to a few hundred dollars. Time lost during repairs to the machine amounted to about four days.

Without this quick-acting fire control, the entire machine might have been involved by rapid spreading of the fire. In that event the damage probably would have amounted to nearly $20,000 and the machine would have been out of service for six to eight weeks.

CO_2 Minimizes Damage from Chemical Fire

In the still room of a large chemical plant a mishap occurred whereby water came into contact with metallic sodium, causing a savage fire. The panic-stricken attendant fled. When the company's fire department arrived, the fire had gained considerable headway, with flames flaring from doors and windows and leaping many feet into the air.

Quick thinking and good judgment in the emergency were shown by the plant fire chief who immediately secured all the portable carbon dioxide firefighting equipment available in the vicinity. As fast as these extinguishers were brought to the building, the valves were opened and the extinguishers were tossed through the windows of the burning room. In this way the fire was snuffed out by diluting the atmosphere with carbon dioxide gas, so that it could not spread to other portions of that building and the plant in general.

Doors, windows, and wood platform were somewhat charred but the fire was virtually confined to the point where it started. Had some unsuitable

extinguishing medium been applied to this blaze, the inevitable result would have been a terrific fire which might have involved the entire plant, resulting in heavy property loss.

*$53 Spent for Recorder Saves $500

"The damn air has gone down again and another batch spoiled!" roared the foreman of the wheel department. "Why in hell don't they speed up or get a larger compressor so that I can get my work done? I guess I'll hit up the boss for a compressor of my own."

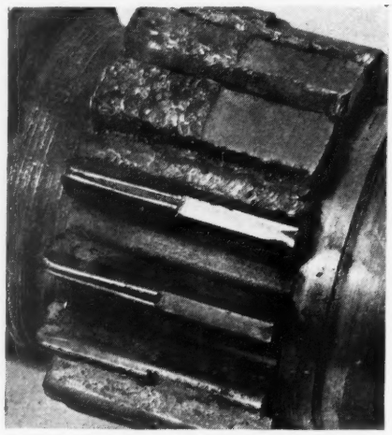
A few days later a quotation was received for the new outfit under consideration—approximately $500.

The plant engineer had a different approach. For $53 he bought a new 10 in. dial, recording pressure gage, driven by a self-contained synchronous clock mechanism. The first day's chart indicated decisively that the pressure dips coincided exactly with the use of the jarring machine. Further investigation showed that the very machine in trouble was the machine that caused all the trouble.

On this machine the internal parts were found to be damaged; a bad pipe nipple (about two turns loose) and a worn taper fit in the throttling cock were teamed up to cause excessive air consumption. None of these defects was even suspected when the jarring machine was in operation because of the normal attendant vibration and noise.

Needless to say, the new unit was not purchased, and we chalked up a saving of $447 because a wise engineer invested $53 in a graphic recorder, which can be applied to many other plant pressure problems as time goes on.—*Philip H. Wilmarth*, The Blanchard Machine Company, Cambridge, Mass.

REPAIR OF PINION BY WELDING SAVED $66



Building up or replacing worn or broken parts of equipment is a practice that is helping many plants to keep maintenance and replacement costs down to a fraction of what they would otherwise be. A simple example of what some of these possibilities are recently came to light in one plant. Here a clutch pinion became useless through wear, after many years of service. Cost of a new pinion was $79. For a fraction of that amount, $12.65 to be exact, the worn places were built up by arc welding and the pinion restored to service as good as new. It was a simple job, but it saved the company $66.45, an amount that is well worth considering

*Goes After the Pennies

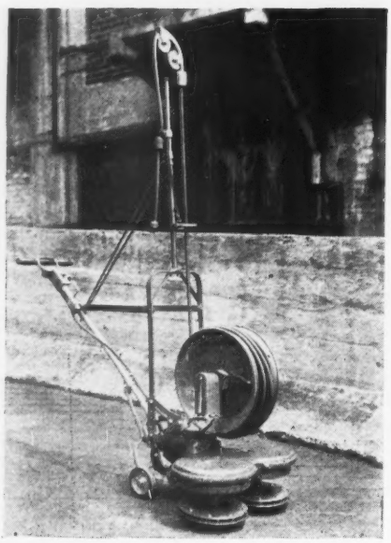
A method designed to gain employees' cooperation in saving "this and that," helped in materially reducing incidental maintenance purchases.

A large plywood board that every employee could not fail to see on entering and leaving the plant was placed near the time clock. Ordinary screw-hooks were placed in the board, upon which were hung various objects that were often swept out with the refuse. Directly below each object, the object's purchase price was plainly indicated.

At the top of the board, the words "Help Save the Pennies" had been lettered in heavy black letters. At the bottom, in finer letters, was "Your Help Appreciated—The Management."

But this "Help Save the Pennies" campaign did not end at this point. To further the employees' cooperation, small boxes were placed about the plant, in which picked-up objects could be placed. Results exceeded the management's expectations, as the number of objects finding their way into the "savings boxes" proved a surprise.—*H. E. Wenrich*, Machinist, Paulton Silk Corporation, Berwick, Pa.

CUTS SCRUBBING COSTS $4,000 ANNUALLY



Since installing two dry-scrubbing machines to maintain wood-block floors between presses, a manufacturer of automobile bodies has saved upward of $4,000 a year. These floors, if not attended to, would often become coated with as much as ⅜ inch of dirt and grease, into which heavy tractors had forced punchings and chips. The resulting combination was nearly as hard as cement and about as hard to remove. The new machines replaced a 2-man steam machine which covered 1,000 square feet per day. Now two men, one on each machine, are doing a much better job and covering approximately twice the old area. Note (in the photograph) the trolley and reel attachment. It keeps the electric cord out of operator's way

Cut Number of Fires 60%

A new fire protection system has reduced the number of fires by more than 60 per cent in sixteen of the largest plants of the Chrysler Corporation. It is based upon organization of departmental brigades and use of first-aid fire extinguishing appliances. The 1937 fire record showed this decrease over the number of fires experienced in 1934, according to the inspection department of the Associated Factory Mutual Fire Insurance Companies.

Instead of a single fire department or brigade trained in the use of large hose and equipment for supplementing the automatic protection, a brigade is now organized in each departmtnt at all Chrysler plants and trained in the use of the equipment at hand, such as fire extinguishers. Each foreman, under the supervision of the plant fire marshal, organizes, instructs, and leads the fire brigade in his own department. The advantages of this arrangement are that the brigade is always very close to the scene of the fire, and the mem-

bers being familiar with the fire hazards and extinguishers required to protect those hazards can act immediately.

All watchmen and plant police are also drilled extensively in fire prevention and protection.

Regulates Setting Speed of Cement

Use of a material which permits regulation of the speed with which cement sets has enabled one plant to save a good deal of expense and trouble in making repairs to its building.

From time to time the edges of concrete ceiling beams and other parts of the building are struck and sizable portions of the edges are knocked off. Occasionally it is necessary to plug up holes and do other work that requires application of cement to a vertical surface, or to the under side of a horizontal surface. In the latter instance, particularly, it is difficult to hold ordinary cement in place long enough for it to set and adhere firmly.

With the material mentioned previously it is possible to regulate the setting speed of portland cement between a range of about 30 seconds to a half hour. Therefore, the speed of setting best adapted to the work being done can easily be obtained.

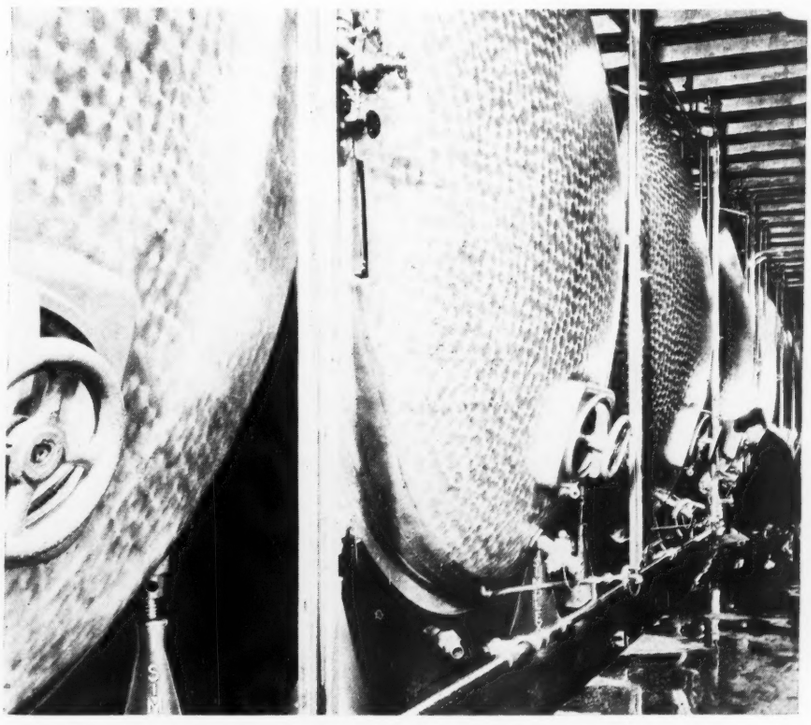
Pads Save Floor Costs

In renovating a portion of its plant, a textile mill planned to replace old wooden floors with concrete. As this decision was reached in the interests of economy, the management was somewhat dismayed to learn from the manufacturers of the equipment to be set up on these floors that it should not be installed on such rigid foundation. Maintenance costs and breakage of parts were sure to be excessive.

One alternative was to lay a wooden floor over the concrete at considerable additional cost. Another was to set the machines on resilient pads. This latter method was chosen.

With the pads as a base, it was possible to install the machinery without drilling any holes in the new floor, a special cement supplied with the pads taking the place of hold-down bolts.

Savings? Several thousand feet of hardwood flooring did not have to be bought and laid. Nearly a thousand holes were not drilled. And after the machines had been in operation a short time, it was discovered that repair and maintenance costs were much lower.



Adjustable supports reduced the cost of installing this battery of beer tanks

Gets Three Lines of Pipe for the Cost of One

Spiral welded pipe for a new white water line saved a Maine paper mill $556.85 in installation costs. As originally designed, the line would have cost $1,521.27. As redesigned using longer lengths, shop-welded fittings and fewer flanges, the cost was $964.42.

What is more, light weight meant easier handling and hanging. Fewer joints meant less assembly work. Maintenance is bound to be less because there are fewer potential sources of leakage.

Results were so satisfactory that two additional orders for fittings have since been placed. Savings on these two jobs have amounted to another $500. In other words, the three lines have actually been installed for the money the first would have cost.

Tank Supports Reduce Installation Costs

An eastern brewery and malting plant installed a battery of 240-bbl. tanks. In place of fixed concrete foundations, adjustable tank supports were used, the caps of the supports being welded to the cradle band.

Use of these supports: (1) Eliminated need for costlier fixed foundations, thus saving on installation costs; (2) provided means for assuring better leveling for drainage of tanks; (3) insured more complete circulation of air around tanks and better clearance for cleaning underneath them; (4) eliminated dust and dirt accumulations and bacterial pockets common to cribbing, fixed foundations, and other means of support.

In addition, these tank supports improve the appearance since they were finished with aluminum paint to harmonize with the aluminum tanks and the nickel piping used throughout this plant.

✦

Diesel-driven pump in Southern plant shows 2-year saving of $4,042 over cost of running the old steam-driven outfit.

✦

Cuts Soap Cost 15%

In the plant of a leading motor car manufacturer a liquid soap formerly was furnished for plant workers to wash with. Cost of maintenance on the dis-

pensers was excessive and the workers were becoming disgruntled because the soap was not satisfactory for removing heavy grease and grime.

Eventually the company adopted a powdered cleaner containing palm, pine, and olive oil soaps, sterilized corn meal, and other mild detergents.

The dispensing equipment formerly used was replaced with solid-brass, chromium-plated dispensers designed for use with the new cleaner. These dispensers have a tamper-proof discharge which is pre-set by the manufacturer. Maintenance costs on the dispensing equipment disappeared immediately.

Despite the fact that more than three times as many workers now use the new cleaner, costs are running about 15 per cent lower than they did with the material formerly used.

Saves Gas, Stops Fires

In an Eastern rubber goods plant large volumes of gasoline vapor were being liberated to the atmosphere because of the heat and pressure involved in the processing of a mastic. Here was a real fire hazard, along with a heavy wastage of gasoline.

A study of the problem resulted in a plan to cover the processing vats with hoods connected to the large-diameter mains of a centrifugal compressor piping system. The pipe areas and velocities were figured to trap all the gasoline fumes, using room air as a carrying medium, and to maintain sufficient velocity to keep the vapors in suspension in the mains. A condenser was installed in the line ahead of the compressor inlet to remove approximately 70 per cent of the vapor, after which the remainder is compressed, providing static pressure to overcome the resistance of the absorption tower in the compressor outlet. The tower recovers the vapor still remaining.

The new system has increased the amount of recovered gasoline 260 per cent over the amount recovered by former methods, saving about $60 per day, in addition to reducing the fire hazard occasioned by large amounts of gasoline vapor in the atmosphere.

A 4-Hour Cleaning Job Now Done in 30 Minutes

Cleaning was merely scratching the surface in a big Ohio metal-working plant. It owned a small dry-scrubbing machine, to be sure, but the job was just simply too big for it.

The answer proved to be a bigger machine of the type that scrubs, rinses, and dries all in one operation. The big machine now concentrates on large areas like the main aisles, leaving the small outfit to take care of the nooks and corners and hard-to-get-at places.

Savings? Well, it used to take 2 men 4 hours to do the main front aisle with the small dry scrubber. Now 1 man, using a solution of hot water and soda, removes every trace of oil and grease in 30 minutes. Floors are much cleaner nowadays, and certainly a lot safer.

Waterproofs Its Old Wood Floors

A company that manufactures casing for meat products had a serious problem in a wood floor subjected to water and fatty acids. Usual methods of preventing seepage through the floor were so inadequate that the entire space on the floor below was rendered useless.

All leakage was stopped and the floor made ready for use in a minimum of time by placing a special, acidproof membrane over it. This membrane in turn is protected by a wear-resistant surfacing material. The new floor is easy to clean and has stood up well.

Acidproof membrane, topped by wear-resistant surface, made old floor like new

Asbestos Steam Hose Outlives Common Kind

A large Mid-West soap manufacturer has cut the cost of steam hose, which is employed extensively throughout the plant, through the use of a hose containing asbestos. Hose formerly used gave only from three to five weeks' service; therefore replacement costs were high. In an effort to reduce this expense a piece of asbestos hose was tried out. This hose is still in service after two years' continuous use.

Steam hose is used in this plant to inject saturated steam at 100 pounds pressure into tank cars containing fatty acids and tallows, in order to liquify these materials and make them flow more readily.

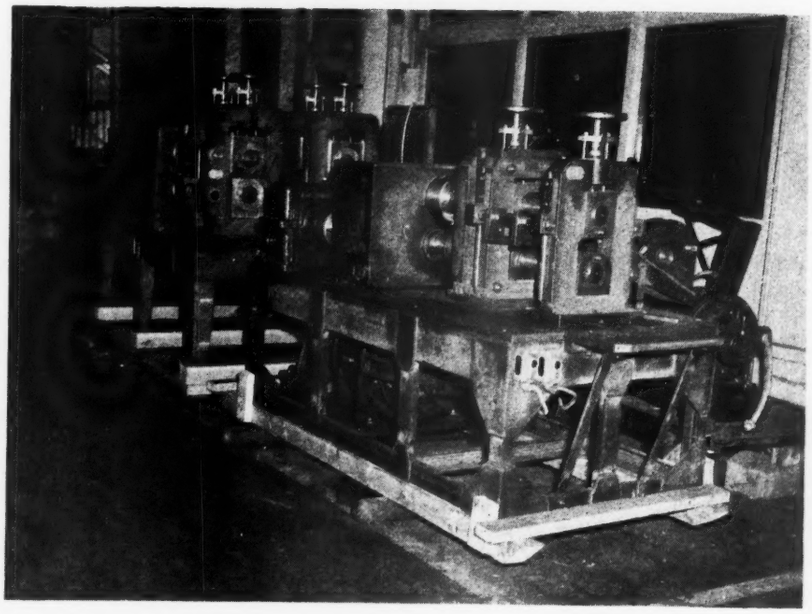
Saves 80% on Water Bill

A large copper company located on a river from which it obtains water power was forced to use city water for general mill service because the river contains waste rubber from a chemical plant up-stream, in addition to the usual river trash. Conditions are very bad at high river stages.

Installation of a multiple-disc, edge-type, self-cleaning filter made it possible to use the river water for general purposes, thus reducing the water bill by 80 per cent. The saving was sufficient to pay for the filter in the first year of operation.

Cleaner blades in the filter installed in this plant were constructed of stainless steel to withstand the unusually severe service conditions.

WELDED PART SAVES 30% WEIGHT, 30% COST



Replacement of an old cast-iron part by an arc-welded steel part saved the Cleveland Graphite Bronze Company 30 per cent in weight, 30 per cent of cost. The part in question is the base for a strip slitter and rolling machine. It is 16 feet long, 4 feet high, and 5 feet wide. It was built entirely from rolled steel shapes, including channels and angles and plate

New Locks Stop Thefts

Recently one of the large oil producers and refiners experienced unaccountable losses of company property, as well as loss of products, at one of their cracking plants. Invariably these losses occurred during the interim when employees were shifted, changed or let out; hence they were impossible to trace or recover.

This situation was met by the installation of a new system of locks, whose combination can easily be changed. Now, whenever a change in personnel is about to be made, the division auditor, with the help of a few trusted employees, simply removes all the interchangeable cores previously used in locks throughout the plant, and replaces them with cores having a different combination. This operation, which is easily performed with the aid of a special control key, takes about an hour's time.

The results have been elimination of all shortages and losses, with savings in time and money that are far in excess of the small cost involved. In this way complete control of company property is obtained by those in authority. Responsibility for thefts or shortages is definitely placed upon those certain members of the factory organization who have been entrusted with the keys for the new locks.

No Incinerator Repairs in 17 Years

In 1921 a cutlery manufacturer built an incinerator, 14 x 4 feet. Ordinary red brick and Portland cement were used for the exterior walls. The 9-inch roof is protected from the weather by a top coat of cement. Inside, the side-and end-walls and roof were lined with a 50:50 mixture of a high-temperature cement and crushed fire-brick. These walls are 6 inches thick.

During the 17 years that this incinerator has been in service, no repairs have been required for any part of it.

✦

Vacuum cleaning equipment installed in the gold room of a plant that uses big quantities of the precious metal, recovered enough the first week from cracks in floors and walls to pay for the installation.

✦

New Pump Halves Cost

A southern textile mill replaced an old pump with a close-coupled centrifugal design. It is used for boiler feed service, and also furnishes water for fire protection and other uses.

This pump has been operating 24 hours a day for the past year, pumping 90 gallons per minute at a total head of 235 feet. A careful check has shown that the cost of operation has been only

$250 PUTS $5,000 SHEAR BACK TO WORK

Saved a $5,000 shear for $250, the total cost of repair made by arc welding. That is the profitable experience of Clifford-Jacobs Forge Company, Champaign, Ill. Excessive overloading caused the shear to break at the points indicated by the chalk marks. The shear had been in constant use three months after the repairs were made, being often worked at 100 per cent overload

about half that of the pump which it replaced.

At the present rate of saving, it is estimated that this pump has already repaid its entire cost, including the motor, several times over.

Turbine Pump Stops Oil Leakage Nuisance

A well-known chemical plant was faced with the problem of handling mineral oil having a specific gravity of 0.77 at the rate of 20 gallons per minute, under a head of 60 feet. With conventional pumps it was found that there was considerable seepage through the packing glands. Loss of the oil was a matter of some concern, and the frequent repacking in an effort to check this waste resulted in high maintenance costs. Not only were the pumps costly in operation but the constant leakage became a source of annoyance to everyone concerned.

The situation was corrected with the installation of a turbine pump of suitable size. Elimination of oil leakage and the high cost of maintaining the pump formerly used has resulted in a considerable saving.

Leather Packing Outlasts 10 Pistons

Substitution of a suitable leather packing in place of bronze pistons in a cylinder which pushes clay through a small orifice resulted in a considerable reduction in maintenance expense, in one plant.

These leather packings give about ten times the life formerly received from a bronze piston. Furthermore, when the bronze pistons which were formerly used had to be replaced, it was necessary to regrind the cylinder each time a new one was fitted. This expense has now been eliminated.

Cheaper to Buy New Sweeping Brushes

Thorough cost analysis showed a Mid-Western concern that it is cheaper to discard worn floor-sweeping brushes than to keep on using them. The figures showed, for example, that discarding brushes which were worn down more than 20 per cent—that is, the length of trim remaining was only 80 per cent of its original length—brought about sufficient savings in labor cost to pay for new brushes.

The porters now have available several hours extra each week for other work in the plant.

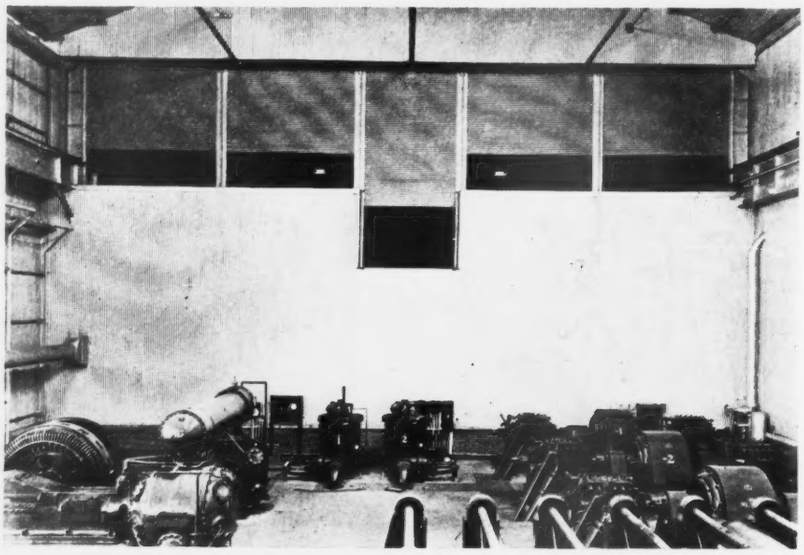
For Foundation Piling, Creosoted Timber

A large chemical plant has surveyed its foundation construction practice to determine whether it is economical to use untreated piling cut off at the permanent ground water level with concrete footings carried down to that point, or pressure-creosoted foundation piling that would extend above the water table up to the approximate ground level, where it would be capped with concrete footings.

The former method calls for cheaper and shorter piling, but the amount of concrete work is greater because the footings must be carried deeper. It also depends upon a fixed minimum elevation of the water table for protection against depreciation of the timber piling.

Results of this study indicate that the use of creosoted timber piling could generally be justified where it was possible to raise the pile cut-off by 20 per cent of the length of untreated piles required for the job. The study indicates that savings can be made by raising the cut-off as little as 5 feet.

ROLLING DOORS PROTECT CRANE OPENING



A problem that confronted one plant was how to provide a simple and satisfactory means of closing a crane opening at the top of a corrugated iron partition which separates a room containing air compressors and other equipment from the remainder of the shop. Permanent closure was not possible because service of the crane is frequently required. Solution of the problem took the form of installing five motor-operated steel rolling doors working in conjunction with four motor-operated movable center mullions or posts. To protect the equipment in the air compressor room, the rolling doors are normally kept closed. When the crane is needed in this department, however, they can be quickly rolled up out of the way merely by pushing a button

Portable Pipe Fitter Goes to the Job

A Mid-West leather company found that a portable pipe-cutting and threading machine considerably reduced the cost of installing and replacing piping. It was purchased specifically for use on a new building in which all sizes of pipe up to 6 inches were to be installed.

Since that job was finished the machine has been in continuous use, because it can easily be taken to any place where pipe has to be cut or threaded. Even the carpenters use it to thread bolts and rods.

✦

Steel knives used in a wood hog wore out too fast to suit a pulp mill's manager. Cut now from steel plate, faced with a hard-surfacing alloy, the new knives cost about 33 per cent less, last 6 times as long.

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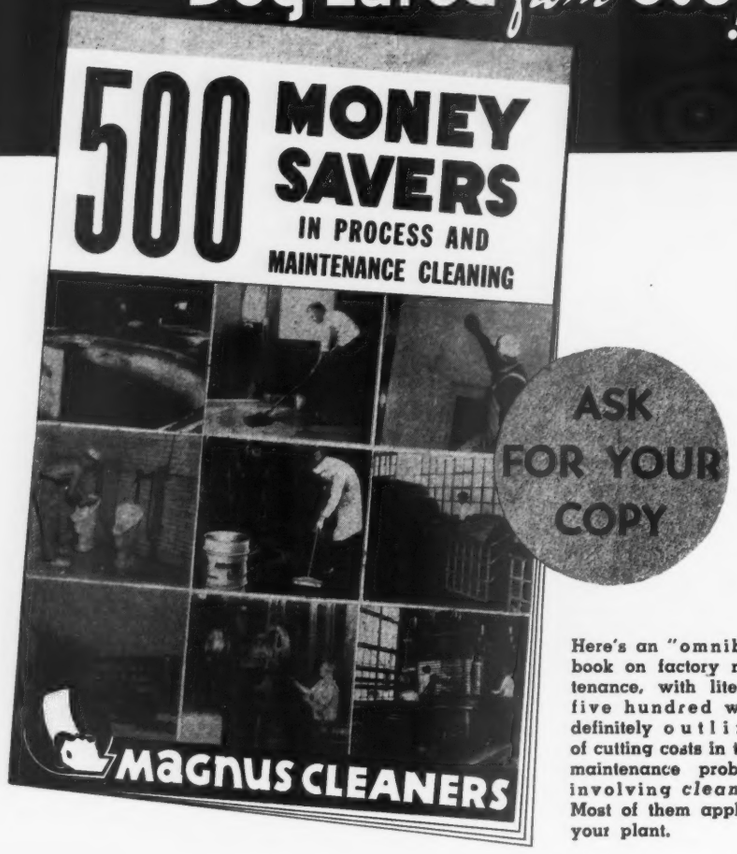

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"Build the Plant Around the Process"
"What Industry Must Know About Building"

July 1939

"Is This the Plant of Tomorrow?"

August 1939

"Windowless—and It Works"
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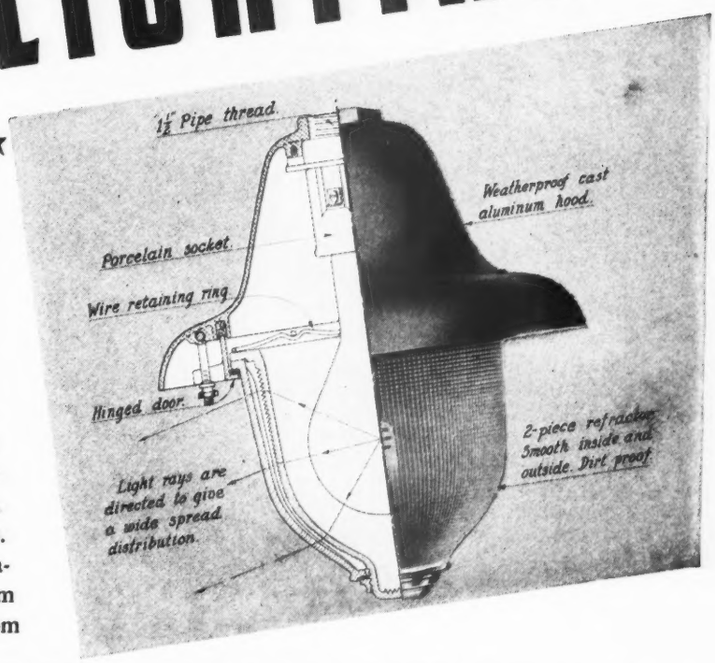
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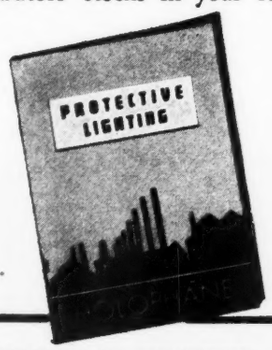

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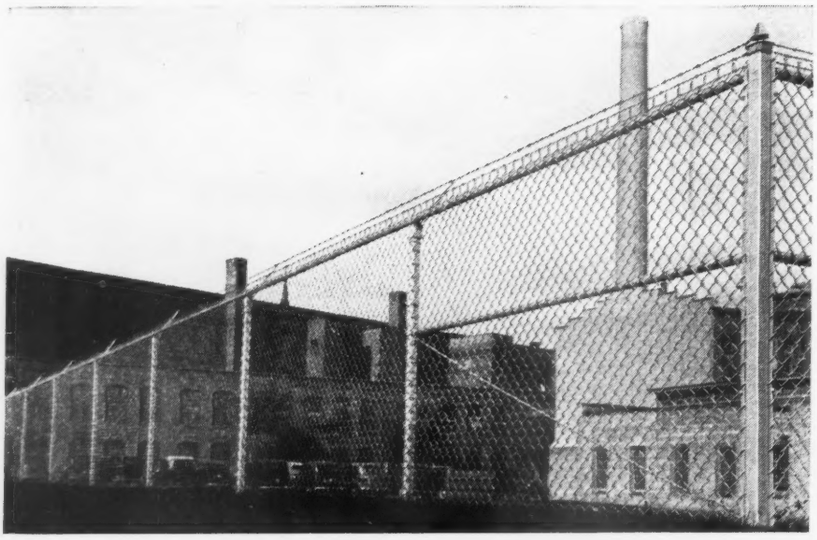

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"I checked 27 items that I am sending out to 14 persons in our organization for their consideration."

"I am passing this issue on to operating men in my department, asking them to list 10 specific items that they think will be helpful to our operation."

"I am in the midst of reviewing the issue in detail myself, after which I propose to hand the issue to our Methods Department and ask them to check each section."

"I have found this issue most interesting. I sat down of an evening and read it from cover to cover just like a gripping novel. Many of the sections that apply to our problems I marked and then passed the magazine on its rounds through the factory."

"I should like very much to have another copy of the November issue, as I intend to make clippings of the one I now have and route the different sections to the heads of the departments who would be most interested."

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- ☐ Coals for Power Plants, Bunkers, Smithies, Processing, etc.
- ☐ Coals for Stokers
- ☐ Coals for Domestic Use
- ☐ Self-aligning Couplings
- ☐ Carpenter Centrifugal Driers for Dewatering Granular Materials

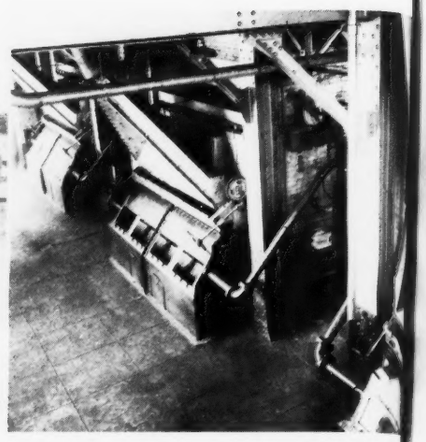
Your Name .....

Title .....

Address .....

YOU CAN MAKE EXTRA PROFITS WITH KOPPERS PRODUCTS

KOPPERS COAL TAR ROOFS. The general Roofing Specification Book explains how to get greater life from your roofs, greater freedom from leaks and other damage. Send the card which is part of this page, for your copy.



KOPPERS INDUSTRIAL BOILER PLANT SERVI The boiler plant folder tells how to have power survey made of your plant to determi the most economical method of obtaini the power you need. Send card for your cop

PRESSURE-CREOSOTED PILING, STRUCTURAL TIMBER, ETC. Send for the folders of The Wood Preserving Corporation, described on the post card on this page. They explain how pressure-creosoted timber gives permanence, decay-resistance, termite-resistance, etc. at lower cost than for other permanent materials.

KOPPERS COAL. The Koppers Coal folders describe many types of coals available for industrial and metallurgical uses, gas-making, etc. and enable you to choose which one is best suited for your requirements. Send the post card for your copies of these folders.

KOPPERS AMERICAN HAMMERED PISTON RING The piston ring folders listed on the post ca which is part of this page tell you how select the proper piston ring set-ups f Diesel motors, compressors, hydraulic press etc. One of the sheets also tells how to orde piston rings. Send for your copies.

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BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 1046, SEC. 510 P. L. & R., PITTSBURGH, PA.

KOPPERS COMPANY

1108 KOPPERS BUILDING

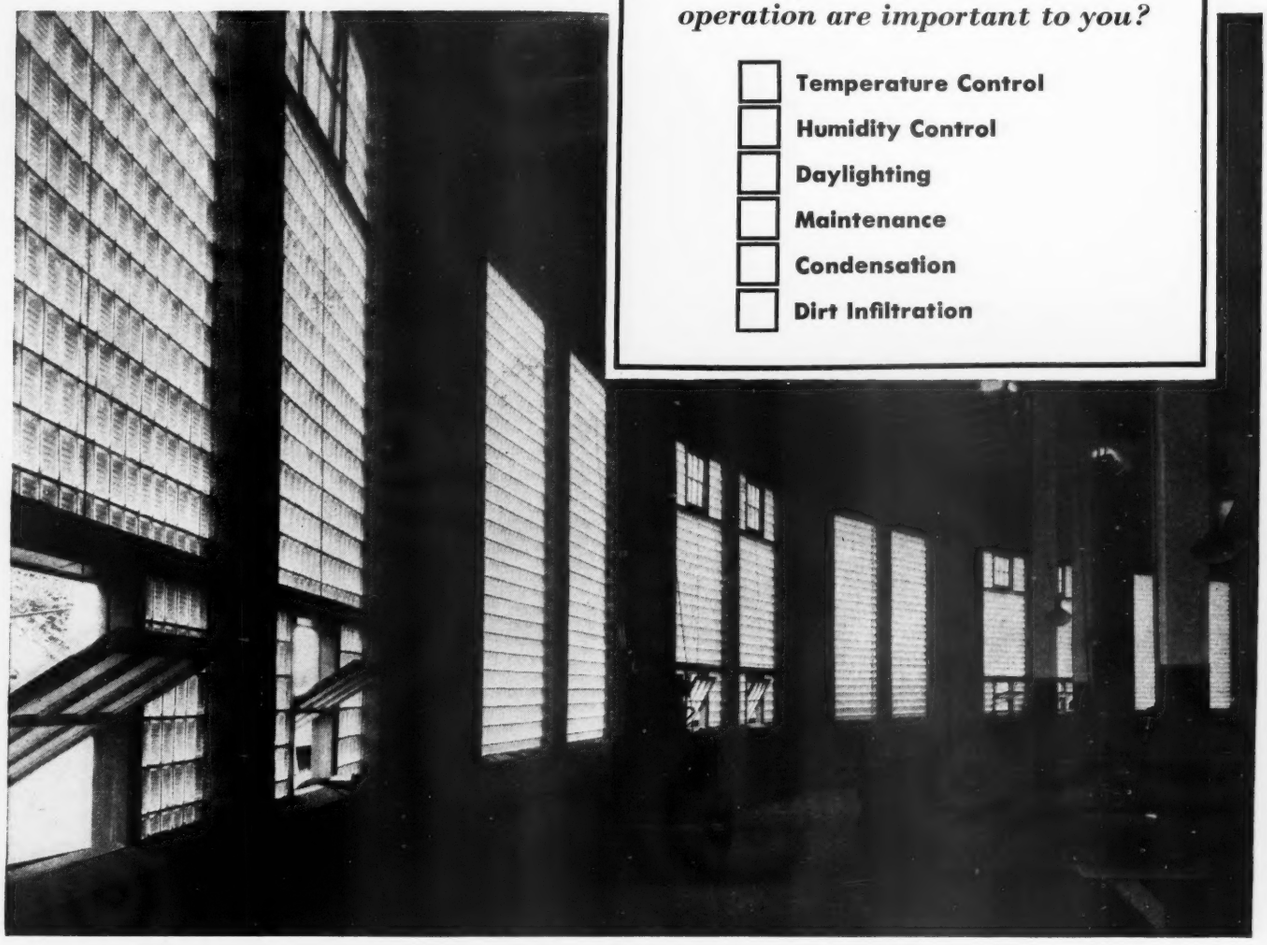
PITTSBURGH, PENNA.

KOPPERS PRODUCTS DO A BETTER J FOR YOU . . . and they are backed with a complete file of product i formation to help you do a better j with them. Facts. Figures. Size Measurements. "How to do it" i formation.

Tear out this card. Turn to t reverse side. There you will find lis some of the product information folde which can help you in your wo Check off the ones you want and m the card (no postage).

USE THIS CARD

MAYBE *YOUR* PLANT HAS A PROBLEM WHICH PC GLASS BLOCKS CAN SOLVE



Which of these factors in factory operation are important to you?

- ☐ Temperature Control
- ☐ Humidity Control
- ☐ Daylighting
- ☐ Maintenance
- ☐ Condensation
- ☐ Dirt Infiltration

PC GLASS BLOCKS are not a cure-all . . . but it's remarkable how many factory problems they can solve. Their thermal insulation value is high . . . and they therefore make it far easier to maintain uniform temperatures in your plant. Similarly, they simplify humidity control, and practically eliminate condensation of moisture on light areas, because of their insulation properties. Made of crystal glass, they transmit floods of diffused daylight which improves working conditions. They eliminate infiltration of dirt at light areas . . . so often a vital consideration where delicate processes are involved. And because PC Glass Block panels are exceptionally easy to clean, and have no wood or metal sash to rot, rust or need repainting, they substantially reduce maintenance costs.

Remember, too, that PC Glass Blocks greatly add to factory appearance, inside and out . . . and that plants of every description have found them practical, economical and really helpful. Send the coupon for our free illustrated booklet containing complete information. PC Glass Blocks are manufactured by Pittsburgh Corning Corporation.

Distributed by

PITTSBURGH PLATE GLASS COMPANY

and by W. P. Fuller & Co. on the Pacific Coast

PITTSBURGH PC CORNING *Glass Blocks*

Pittsburgh Corning Corporation
2037-9 Grant Bldg., Pittsburgh, Pa.

Please send me, without obligation, your new book of facts about PC Glass Blocks entitled "The Glass Age Arrives."

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New Odor Adsorber

REMOVES ODORS, GASES, OIL VAPORS

From Compressed Air Lines

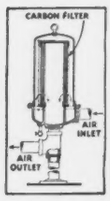
You can now eliminate contamination of products and have complete freedom from odor troubles — by *actually removing* odors, *oil vapors*, fermentation vapors and other objectionable gases from compressed air with the DOREX Pipe Line Odor Adsorber. This new development is a simple auxiliary air stream "filter" of activated coconut shell carbon — a powerful commercial adsorption agent which will adsorb and hold odors up to 15—20 per cent of its own weight.

The "filter" unit is readily installed at any desired point in the airline. Standard sizes are available for handling compressed air capacities from 12 to 560 c.f.m., and pipe connections are available from 1" to 6".

If you want compressed air free of all odors, vapors and similar impurities, many of which cannot be eliminated by filters, commercial separators, aftercoolers or scrubbers, write us today outlining your problem.

If You Have An Odor Problem of Any Kind—Send for Our Booklet on Odor Control

Strong cast outer shell houses the special "odor-filter."

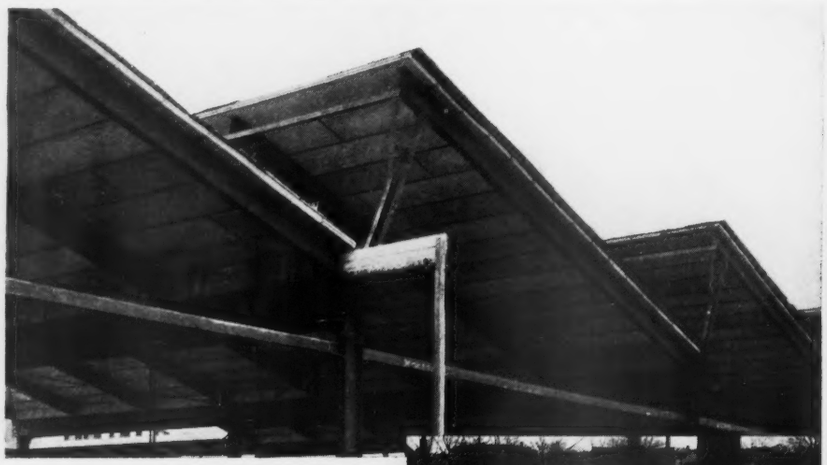


There are no moving parts—nothing to get out of order.

Pats. Pend.

Dorex Air Conditioning Division
W. B. Connor Engineering Corp.
112-A E. 32nd St., New York City

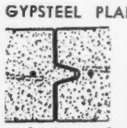
DOREX



GYPSTEEL PLANK SIMPLIFIES FIRESAFE ROOF-DECK CONSTRUCTION

ANY type of roof frame is easier to design and erect when firesafe GYPSTEEL PLANK* is used for the deck. For PLANK is a pre-cast unit, tongued and grooved and made in standard sizes that will fit varying purlin spacings. PLANK may be used on any type of roof—flat, pitched, sawtooth, monitor mansard, etc., and placed running either up or down the slope. The result, in any case, is a strong, uniform job laid with a minimum of labor and cost, and with no waste in material. Whatever type of roof you are contemplating, you can solve the deck construction problem at low cost with PLANK. It handles like wood, cut, sawed, nailed or bored —and the cost of erection is not greater.

Write—now—for the PLANK BULLETIN, which tells you how *Plank* simplifies firesafe roof-deck construction.



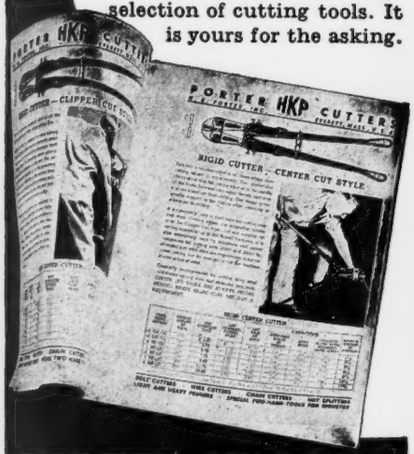
GYPSTEEL PLANK is a complete structural unit shaped like lumber. Made of extra dense, nailable gypsum. All four sides are bound with galvanized steel tongues and grooves which lock to form a strong, continuous I-BEAM. Center is reinforced with steel wire mesh. Vermin-proof, termite-proof. Will not shrink or warp.

*The term PLANK as applied to cementitious building products is a trade-mark of the American Cyanamid & Chemical Corporation.

AMERICAN CYANAMID & CHEMICAL CORPORATION
Structural Gypsum Division
ROCKEFELLER CENTER • NEW YORK, N. Y.

IN THIS BOOK

Clippers to cut metal as thick as your thumb — big powerful tools for heavy construction and maintenance jobs. Other sizes to fit every need. Special tools for cutting cable, flat stock, etc. A Compact to fit a small tool bag. Swivel head models — the "wrist action" tools which reach around corners at all angles. This catalog covers the entire Porter line. Gives facts about hardness of metals and selection of cutting tools. It is yours for the asking.



PORTER CUTTERS

THE SWIVEL HEAD

Here is a Porter Clipper just like the standard rigid models except that the entire cutting head is on a swivel giving it "wrist action." You swivel the tool just as you would bend your wrist to reach over or around obstructions. Wherever the tool reaches it will cut — at any angle. Saves dismantling and awkward reaching. Cut on floor, wall or ceiling without stooping, reaching or straining. Long leverage handles, full power multiplying toggle joints, same Porter construction and fine quality. Made in several sizes. Here is a Clipper that "goes places" — does its work easily, quickly and economically. Fully illustrated and described in the Porter Catalog.

BUY THRU DISTRIBUTORS

The Bolt Clipper People
EST. 50 YEARS

H. K. PORTER, INC.
14 ASHLAND ST., EVERETT, MASS.

A better and Safer Plant to work in

Photo shows "A.W." Super-Diamond Pattern

"A.W." Rolled Steel Floor Plate is the choice of men in industry because it makes every plant a better place to work in. With this modern industrial flooring, there are no worn and slippery surfaces to endanger men on foot. No cracks and ridges to slow down or upset small wheel or heavy duty floor trucks. "A.W." Floor Plate makes floors permanently safe. There is no maintenance expense because toughest traffic will not damage or impair it. Easy to clean. Quick to drain. Oil-proof, heat-proof, crack-proof. Can be cut to any shape and installed without disturbing production. Find out how little "A.W." Rolled Steel Floor Plate costs in terms of trouble-free floor protection. Write for literature showing five patterns and giving complete engineering data.

"A.W." *Rolled Steel* FLOOR PLATE

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS, CONSHOHOCKEN, PENNA. : : SINCE 1826 : : DISTRICT OFFICES AND REPRESENTATIVES—Philadelphia, New York, Boston, Detroit, Los Angeles, Seattle, San Francisco, Houston, Roanoke, Buffalo, Pittsburgh, Cleveland, Chicago, Cincinnati, New Orleans, St. Paul, St. Louis, Montreal. PRODUCTS INCLUDE—"A. W." Rolled Steel Floor Plate : : "Swede" Pig Iron : : Billets—Blooms and Slabs : : Sheared Steel Plates : : Hot Rolled Sheets and Strip : : Steel Products also furnished in Copper and Alloy analyses.

Use the Coupons

Many advertisers in this issue of FACTORY have not only given you valuable information in their advertisements, but have made it easy for you to get even more detailed data on products and services that can save you money—by inserting coupons in their advertisements requiring only your name and address. Other manufacturers have made valuable catalogs available to you through the Catalog Service Pages found in every section of this issue.

Use them. Tap the valuable information thus easily made available to you.

Say it again—LOUDER!

This phone booth blots up plant racket

● Shop telephone mistakes are often serious. Improve your shop telephone service and stop these wasteful errors. Do what hundreds of plant managers have done—install a Burgess Acousti-Booth.

Illustrated Booklet Sent Free

Learn why this acoustically engineered booth improves telephone hearing conditions. Find out why it blots up noise and makes telephoning easy. Send the coupon for the Free Booklet giving illustrations of all models, prices, specifications, list of users. SEND IT NOW!

Burgess: Send me Free Acousti-Booth Booklet, without obligation!

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Operating under Burgess Patents

BURGESS

For the stranger in our midst—

When a copy of FACTORY is handy in plant or office, a non-subscriber like you is bound to pick it up and glance through it. With benefit certainly, for there's plenty in this and every other number of value to you, if you hold a responsible position in industry.

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Finnell Equipment
SAVES PLANT... $4000 ANNUALLY

Another notable example of substantial savings effected through the use of Finnell floor-maintenance equipment is the case of an automobile body and fender manufacturer. In this plant, oftentimes the wood block floors between the huge presses became coated with as much as ⅛" of dirt and grease, into which heavy tractors had forced punchings and chips — a combination nearly as hard as cement and as difficult to remove.

Prior to the Finnell installation, the plant used a steam machine, operated by two men, to remove the accumulation, covering 1,000 square feet of floor per day.

Since the installation of two Number 84-X Finnell Industrial Dry Scrubbers, the two men (one to each machine) cover approximately *twice* the former area per day. The result is a saving of more than $4,000 annually. And in addition to this substantial reduction in cleaning costs, the floors are cleaner and safer and production aided thereby.

The Finnell equipment was purchased from actual demonstration, after a series of comparative tests with various other makes.

See what it will save you

Demonstration — on your own floors — involves no obligation. Phone nearest Finnell branch, or write Finnell System, Inc., 2511 East Street, Elkhart, Indiana.

FINNELL SYSTEM, INC.

Pioneers and Specialists in FLOOR MAINTENANCE EQUIPMENT

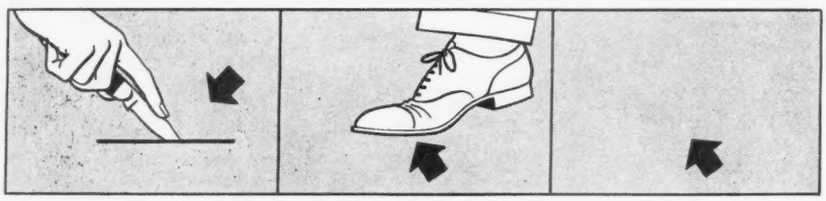
USE MASTIPAVE

the floor that heals itself

and wears...and wears...and wears!

Wood floors wear and splinter. Cement chips, is cold and dusty. Metal is slippery. Mastipave gives long wear at lowest cost. Being mastic, it "gives" with pressure and tends to absorb noise. Because of its asphalt-felt base it is resilient. Although its smooth surface is not slippery it is easy to clean. • Mastipave has *proved* itself on large-area, heavy-traffic floors in many types of industry. It is water-proof—rot-proof, vermin-proof. • Mastipave is available in rolls or factory-cut tiles in gloss black, maroon, brown, or dark green. Laid by cold cementing to concrete, wood, or metal floors with a special water-proof cement. Ready to use the instant it is laid! No interruptions! • If you have a flooring problem or plan on rebuilding or remodeling, you should know the Mastipave story. There are authorized Mastipave contractors in all principal cities —consult one of them or write The Paraffine Companies, Inc.— New York, Chicago, San Francisco.

MASTIPAVE HEALS ITS OWN INJURIES



1 Cut Mastipave with a knife | 2 Rotate ball of foot on cut | 3 Mastipave has healed itself!

FOR

Factory storerooms
Ramps
Corridors
Mess halls
Shipping rooms
Warehouse floors
Laboratories
Auditoriums
General offices
Display rooms
Reception rooms
Lavatories
Locker rooms

MASTIPAVE

THE LOW-COST LONG-LIFE

FLOOR COVERING

Conveying machinery

—its merits
—its uses
—how to select it

This is a complete survey of the use of mechanical handling devices in industry. In showing the advantages of the several forms of conveying machinery for various industrial purposes, it provides a useful guide to economy and efficiency in the selection of handling equipment.

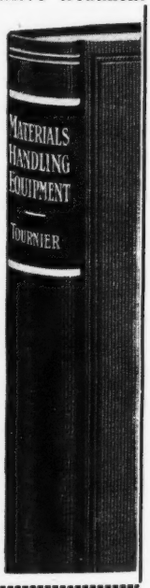
MATERIALS HANDLING EQUIPMENT

By EDWARD J. TOURNIER

371 *pages, illustrated,* $4.00

IT is the purpose of this book to set forth the results, in service, of those mechanical handling devices which are most frequently used, to show how these devices are adapted to different uses, to indicate the methods by which a proper selection may be effected, and to serve as a guide to the most economical methods in purchasing machinery selected.

In fulfilling this purpose the book gives a thorough and comprehensive treatment of the whole subject of mechanical conveying, including the general principles underlying its place as a tool of production. Many examples of effective methods and equipment in use today are given.



Covers:

—General principles of commodities handling
—Interdepartment transfer
—Materials handling between floors
—Salvaging industrial waste with conveyors
—Mechanical handling of specific materials and commodities
—Principal types of conveying machinery and their uses

SEE IT 10 DAYS
MAIL THE COUPON

McGRAW-HILL ON-APPROVAL COUPON

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330 West 42nd St., New York City

Send me Tournier's Materials Handling Equipment for 10 days' examination on approval. In 10 days I will send $4.00, plus few cents postage, or return book postpaid.

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Is Maintenance Important?

Some companies consider maintenance a necessary evil, others recognize that a well planned program is the best insurance for continuous production and low cost operation.

Some of industry's most highly respected maintenance executives have written their views in recent issues of FACTORY.

If you have not already read these articles, we suggest that you review them because they offer many good sound reasons why maintenance is important.

Maintenance Is a Builder of Employee Morale

Chester F. Horne, Factory Superintendent, Hygrade Lamp Div., Hygrade Sylvania Corp.—October 1939.

Maintenance Is Insurance Against Plant Shutdown

A. E. Windle, Plant Engineer, Colgate - Palmolive - Peet Co.,—September 1939.

Maintenance Is the Guardian of Our Plant Investment

Elliott I. Petersen, Superintendent, Bigelow-Sanford Carpet Company, Inc.—August 1939.

Effective Maintenance Works With Production

John I. Thompson, Director Engineering and Maintenance, Sharp & Dohme—July 1939.

The Success of Production Is Tied to Maintenance

Alfred Vaksdal, Plant Engineer, Corning Glass Works—June 1939.

A Plant Is No Better Than Its Maintenance

Frederic Oakhill, Mechanical & Maintenance Engineer, United Wall Paper Factories, Inc.—May 1939.

Read FACTORY's "Maintenance Services" Section every month for tested methods gathered from plants all over America.

The Cheapest, Most Practical Way to Clean Your Plant

•

LOOK WHAT THESE VACUUM CLEANERS WILL DO

First of all, they ***really clean*** because dust and dirt is ***removed,*** not scattered around to resettle and damage equipment, machinery and product. The plant is virtually dust-free.

Invincibles clean all types of floors, from rough concrete to highly finished wood, and will handle practically any kind of dirt and litter except in the presence of water or oil.

Crowded, close quarters are no handicap to Invincible Vacuum Cleaners. Far from it. Invincibles clean wherever brooms can be used and a lot of places where brooms cannot reach.

Overhead cleaning of pipes, beams, walls, etc., become easy operations with Invincibles. Incidentally, with Invincibles on the job, these parts of the plant ***stay clean*** much longer.

Invincibles are invaluable for cleaning bins, shelving, motors, machinery, boiler tops, workbenches, conveyor belts, etc. If desired they may be used as efficient blowers.

Invincibles substantially decrease cleaning costs. One Invincible Operator often does the work of ***three men*** with brushes and brooms and saves an average of $2000 per year in payroll.

Last but not least, Invincibles seem virtually indestructible. Thousands of them have passed their twentieth year of continuous service. Before you say, "Vacuum cleaning is not practical for our plant," *talk to Invincible.*

INVINCIBLE VACUUM CLEANER MFG. CO.
... 440 DAVIS · DOVER, OHIO

Buildings, Services and Maintenance

FACTORY, through the cooperation of leading manufacturers, makes it possible for you to secure catalogs, bulletins, and booklets listed here without cost or obligation. Check and fill out the coupon below and send it to FACTORY. See other sections for additional catalog listings.

1 **Acoustic Telephone Booths**—Bulletin describing telephone booths especially designed for noisy factory locations, tells how quiet is obtained without doors through acoustic properties of booth. Well illustrated showing various models and quoting prices. **Acoustic Div., Burgess Battery Co.**

2 **Air Compressors**—Bulletin HAC-40 describes a line of horizontal single-stage compressors. Gives complete construction details, application photographs and rating tables, as well as a description of the "Duomatic" control. Operating pressures from 35 to 150 lb. and horsepower ratings from 15 to 125 hp. **Gardner-Denver Co.**

3 **Centrifugal Pumps**—Attractive 50-page catalog 1651-A lists a comprehensive line of centrifugal pumps for all types of plant pumping problems. Contains hundreds of application photographs, as well as photographs of construction details of the various models available. Has reports of engineering tests and performance data. **Centrifugal Pump Division of Allis-Chalmers.**

4 **Clippers and Cutters**—New catalog illustrated with action pictures describes complete line of shop clippers and cutters. Lists sizes to fit every need. Clippers to cut steel as thick as a man's thumb, as well as special tools for cutting cable, flat stock, chain, bolts, rods, splitting nuts, etc. Describes swivel head models with "wrist action," reaching around corners at all angles. **H. K. Porter, Inc.**

Use the Coupon to Secure Valuable Manufacturers' Literature

Section 5 MAILING COUPON—Nov. 1939
Good Until Feb. 28, 1940

Factory Management and Maintenance
330 West 42nd Street
New York, New York

Please have the manufacturers send me, without obligation, the literature circled below. (Numbers correspond to descriptive paragraph numbers).

1	2	3	4	5	6	7	8	9	10	11	12
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Name .....

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Company .....

Street Address .....

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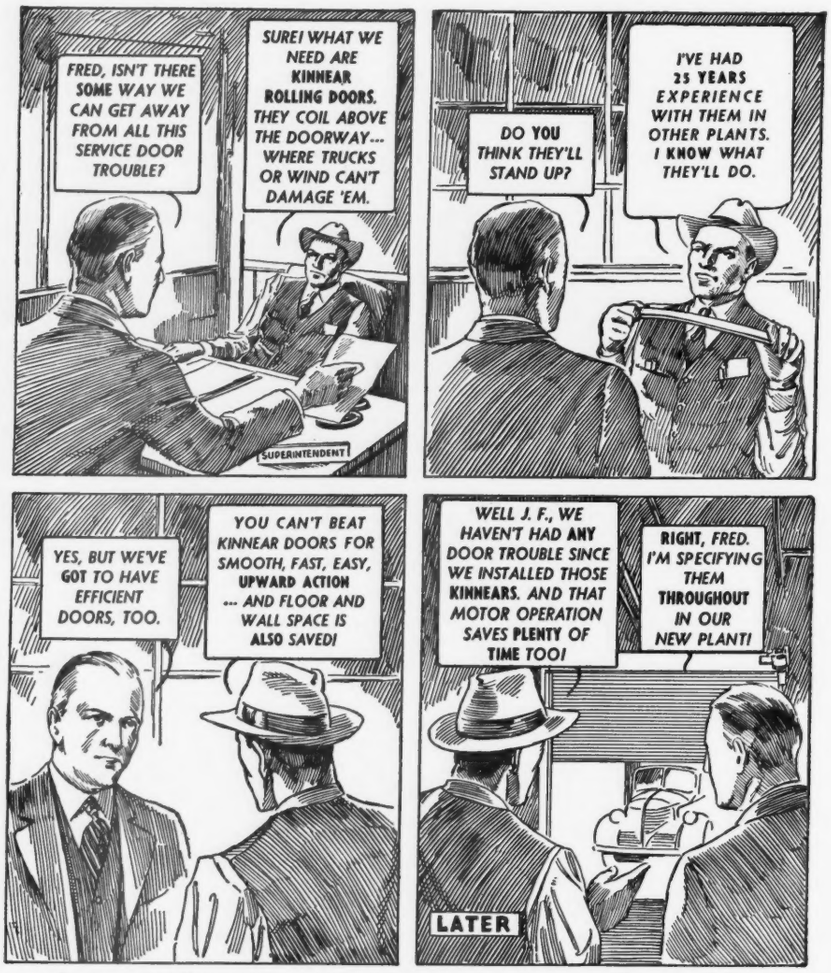
Please fill out this coupon completely in order to avoid delay in handling


FRED, ISN'T THERE SOME WAY WE CAN GET AWAY FROM ALL THIS SERVICE DOOR TROUBLE?
SURE! WHAT WE NEED ARE KINNEAR ROLLING DOORS. THEY COIL ABOVE THE DOORWAY... WHERE TRUCKS OR WIND CAN'T DAMAGE 'EM.
SUPERINTENDENT
DO YOU THINK THEY'LL STAND UP?
I'VE HAD 25 YEARS EXPERIENCE WITH THEM IN OTHER PLANTS. I KNOW WHAT THEY'LL DO.
YES, BUT WE'VE GOT TO HAVE EFFICIENT DOORS, TOO.
YOU CAN'T BEAT KINNEAR DOORS FOR SMOOTH, FAST, EASY, UPWARD ACTION ... AND FLOOR AND WALL SPACE IS ALSO SAVED!
WELL J. F., WE HAVEN'T HAD ANY DOOR TROUBLE SINCE WE INSTALLED THOSE KINNEARS. AND THAT MOTOR OPERATION SAVES PLENTY OF TIME TOO!
RIGHT, FRED. I'M SPECIFYING THEM THROUGHOUT IN OUR NEW PLANT!
LATER

Kinnear Rolling Doors will save money in your plant, too. Get the full story on how they speed up door operation, cut maintenance and repair costs, save floor and wall space, and give smooth, dependable performance at all times -- for a long time! Write today for the complete, illustrated Kinnear catalog!

Offices and Agents In Principal Cities
The KINNEAR MANUFACTURING COMPANY
2060-2080 FIELDS AVENUE **COLUMBUS, OHIO**
Factories: San Francisco, California; Columbus, Ohio

KINNEAR
ROLLING DOORS

5 **Economy in Maintenance Painting**—Master Specifications for Industrial Paints, a valuable aid in developing an efficient maintenance painting program to reduce cost per square-foot-year. Contains equally valuable data for painting new structures, from the shop and field costs for steel to the exterior and interior of finished buildings and other plant structures. **Joseph Dixon Crucible Co.**

6 **Eliminating Odor Problems**—How objectionable factory exhaust and process odors are controlled or completely removed by a new method; how odor control equipment can increase air conditioning efficiencies and reduce costs; how product loss by odor contamination can be prevented by actually removing odors, odorous gases and vapors from any air stream—are all outlined in a new booklet, "Odor Control." **Dorex Air Conditioning Div., W. B. Connor Engineering Corp.**

7 **Exhaust Blower**—Bulletin describes new type portable blower which features completely inclosed motor and elimination of brushes, commutators, gears, and centrifugal switches. Tells how design increases capacity and reduces weight and operating cost. **Sawyer Electrical Mfg. Co.**

8 **Expanded Metal Sample Kit**—Made in filing size and contains six samples of standard and flattened expanded metals, enabling examination of material in different sizes and gauges so that practical application may be appreciated. Suggested uses, factory partitions, skylight, door and window guards, grilles, trays, etc. **Milcor Steel Co.**

9 **Felt**—A 100-page book of felt tests and applications which includes eight chapters outlining the many uses for felt, and gives the results of laboratory tests indicating its performance under all sorts of industrial conditions. Actual samples of tested materials are attached. A valuable book for anyone interested in felt uses, and especially in isolation of machinery vibration. Also an additional booklet describing a more recent use for felt, entitled "A Simple and Rapid Method of Machine Installation." No hold-down bolts are used. A special type of cement holds Unisorb Felt pad to floor and to machine, effectively preventing machines from creeping. **The Felters Co., Inc.**

10 **Fence Facts**—A new booklet illustrating and describing chain link fence in a variety of styles and four different metals for every type of fencing installation. Also wrought iron fence in various beautiful styles. A concise handling of information for those wanting facts about fence. **Page Fence Association.**

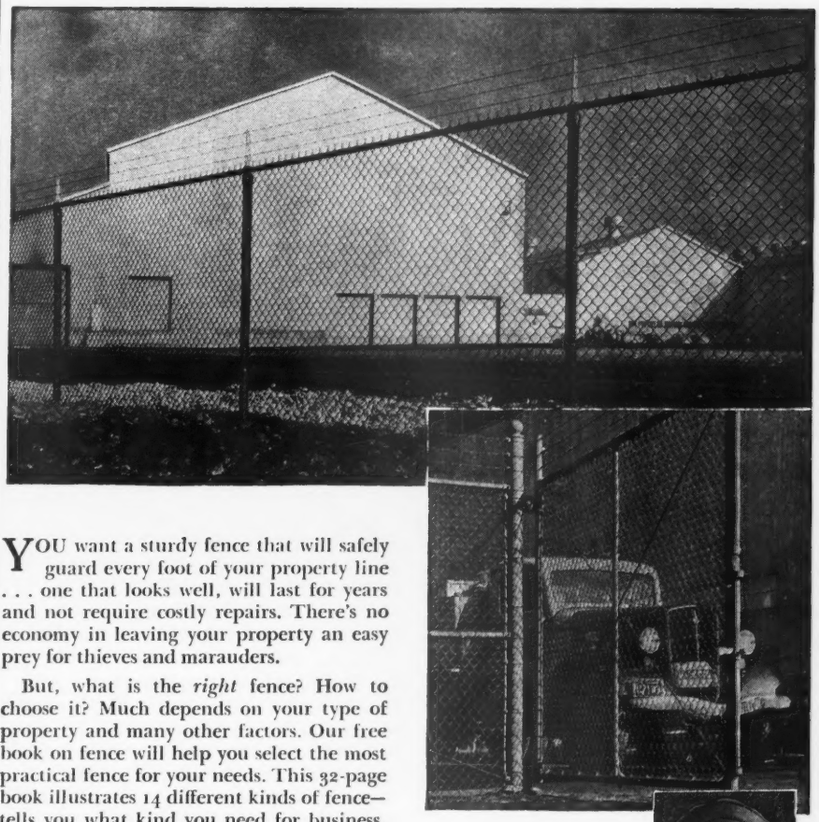
11 **Fire Protection**—A new booklet on industrial fire fighting, called "Don't Play With Fire," describes the way in which carbon dioxide, snow-and-gas smothers Class B and C fires, involving flammable liquids and electrical equipment, respectively. Tells about the various types of Lux equipment for the most common and dangerous industrial fires. Also describes handy portable type fire extinguishers. **Walter Kidde & Co.**

12 **Flexible Metal Hose and Tubing**—"Fact Book of Flexible Metal Hose and Tubing" contains photographs and descriptions of installations, illustrations

(Continued on page 210)

How to Choose the Right Fence

FOR YOUR BUSINESS PROPERTY



YOU want a sturdy fence that will safely guard every foot of your property line . . . one that looks well, will last for years and not require costly repairs. There's no economy in leaving your property an easy prey for thieves and marauders.

But, what is the *right* fence? How to choose it? Much depends on your type of property and many other factors. Our free book on fence will help you select the most practical fence for your needs. This 32-page book illustrates 14 different kinds of fence—tells you what kind you need for business, playground, school or residential property. Tells you how to get fence with rails that won't buckle—gates that won't drag or slip—how to get extra protection against rust with fence that is galvanized *after* weaving.

Whether you need a few feet of fence or miles of it, whether you are planning to build a fence now or later, you need this valuable book. So mail the coupon. And remember that upon request you can have the services of a Cyclone factory-trained engineer. He will help solve your fence problem and give you an accurate estimate of cost. There is no charge for this service.

Now you can be sure of the quality of fence before you buy it. Cyclone Fence with the "12M" label has an extra-heavy coat of galvanizing that resists rust and makes the fence last longer. Be sure that the "12M" label is on the fence you buy.

CYCLONE FENCE COMPANY
General Offices: Waukegan, Illinois
Branches in Principal Cities
Standard Fence Company, Oakland, Calif.,
Pacific Coast Distributors
United States Steel Products Co., New York,
Export Distributors

Send for **FREE** *Illustrated Book*

USS
CYCLONE FENCE

CYCLONE FENCE CO., Dept. 9119
Waukegan, Ill.
Please mail me, without obligation, a copy of "Your Fence—How to Choose It—How to Use It."
Name.....
Address.....
City..... *State*.....
I am interested in fencing: ☐ Industrial Property; ☐ Playground; ☐ Residence; ☐ Estate; ☐ School. Approximately.....feet.

UNITED STATES STEEL

What DO YOU pay for PAINT ?

PRICE per gallon is an easy figure to quote, useful only when you know how many square feet a gallon will cover properly, and how long the paint will protect. Figured that way, the cheapest paint is likely to be the most expensive; the most expensive, not necessarily the cheapest.

True economy is measured by the cost of protection per square-foot-year, and that's how Dixon's Silica Graphite Industrial Paints show their superiority.

The very nature of the pigment gives Dixon's an outstanding advantage, for natural flake graphite is chemically inert and moisture repellant. Its thin, flat particles plate the surface with an armor of overlapping scales that adhere with remarkable tenacity. Silica, combined by nature with graphite, hardens and strengthens the coating; while pure, boiled linseed oil cements the whole into a coat that, in almost countless instances, has withstood the elements and industrial gases for periods as long as ten years.

There's true economy in Dixon's Silica Graphite Industrial Paints. Available in fourteen colors including aluminum. Write for Master Specification 44-B1.

Paint Sales Division

JOSEPH DIXON CRUCIBLE CO.

Established 1827 D X N **Jersey City, N. J.**

DIXON'S INDUSTRIAL SILICA-GRAPHITE PAINT

Careystone Corrugated

ASBESTOS-CEMENT SIDING AND ROOFING

Cuts Overhead Costs for Industry

In the construction of its branch plant at Evansville, Indiana, Compressed Industrial Gases, Inc., used CAREYSTONE Corrugated Asbestos-Cement Sheets for both walls and roof. This job proved so satisfactory that the same material was specified for a second plant unit, recently erected at Evansville.

CAREYSTONE Corrugated is fireproof and long-wearing. Requires no paint protection and minimizes upkeep expense. Easily and quickly applied by low-cost labor. Made exclusively of Portland Cement and Asbestos fibre, the strength of this modern Carey Product actually increases with age. Before you build or modernize, investigate the advantages of CAREYSTONE Corrugated. Full details on request—address Dept. 31.

ASPHALT — ASBESTOS — MAGNESIA

Roofing . . . Flooring . . . Insulations . . . Roof Coatings and Cements
Waterproofing Materials . . . Expansion Joint . . . Asbestos Paper and Millboard

THE PHILIP CAREY COMPANY • Lockland, Cincinnati, Ohio

Dependable Products Since 1873

BRANCHES IN PRINCIPAL CITIES

FACTORY'S Catalog Service
Section 5 (Continued)

of all basic types of flexible metal hose as well as a résumé of their uses and the names and addresses of leading manufacturers who are members of the Institute. Especially helpful for design engineers, manufacturers and maintenance executives. **Flexible Metal Hose and Tubing Institute.**

13 **Floor Plate Catalog**—16-page bulletin describing the application and installation of Inland 4-Way Floor Plate. Also contains helpful data on dimensions and loading. Well illustrated to show applications in many industries. **Inland Steel Co.**

14 **Fume Collector**—Describes an unusual type of fume collector especially adapted to removing fumes from arc welding. Describes flexibility which permits use over a considerable area, gives range capacity and other operating and application data. **Ruemelin Mfg. Co.**

15 **Industrial Rubber Products** — A comprehensive catalog illustrating and describing a complete line of belting, hose, packings, and brake linings. **Thermoid Rubber, Div. of Thermoid Co.**

16 **INDUSTRIAL SKYLIGHTS** — Catalog illustrates various installations and shows the advantages of ventilating skylights to supply maximum light and adequate ventilation. Construction features and operating mechanism are described. Complete specifications and data are included, plus pictures of various models. Can be supplied in galvanized iron, stainless steel, aluminum or copper. **Vent-O-Lite Co.**

17 **Industrial White Paint** — Book, "More Light With Lasting Cleanliness," contains illustrated story of this company's Barreled Sunlight's "rice process" and its 5 contributions to paint maintenance economy. Special supplement explains why this quick drying paint is especially practical for large industrial areas. **U. S. Gutta Percha Paint Co.**

18 **Lockers and Cabinets**—Bulletin describes a line of steel lockers and storage cabinets of many types and sizes. Models are well illustrated and overall dimensions are given. **All-Steel-Equip Co.**

19 **Maintenance Cleaners**—A practical handbook, "500 Maintenance Money-Savers," outlining 500 different ways in which Magnus maintenance cleaners can be used to get better cleaning results at lower cost. Covers all phases of factory cleaning, maintenance, from floors and walls to machinees and equipment. **Magnus Chemical Co.**

20 **Movable Partition Walls**—Folder TR-25A describes the new low-cost movable partition for subdividing office and factory spaces. Erection specifications and drawings of typical details are included in this folder entitled, "Transite Walls-Universal Type." **Johns-Manville.**

21 **Outdoor Lighting**—A complete book describing a line of yard lighting refractors. Tells how each unit is a miniature lighthouse in optical construction and explains why this type of equip-

ment, providing excellent performance, is effective in thwarting lawlessness, fire and theft. Provides complete engineering data. **Holophane Co., Inc.**

22 **Property Protection Fence and Wire Mesh Partitions**—32-page book "Your Fence—How to Choose It—How to Use It" illustrates four kinds of fence. Tells how to choose the right kind to enclose business property, public property or a private estate or residence. Wire mesh partitions also illustrated and described. **Cyclone Fence Co.**

23 **Roof Deck and Flooring**—Booklet describes how gypsum products can be used for the construction of firesafe construction of permanent roof-deck and light load floors for industrial buildings. Available in pre-fabricated units that save time, labor, and money on construction and modernization jobs. **Structural Gypsum Div., American Cyanimid and Chemical Corp.**

24 **Rotary Pumps Catalog**—Catalog F-1 illustrates and describes the entire line of Roper hand and power rotary pumps for pumping any clean liquid. Capacities from one to 700 gal. per min. Pressures up to 750 lb. Drives and mountings adaptable for all kinds of applications. **George D. Roper Corp.**

25 **Scrap Baling Press**—Folder describing presses for economically baling scrap paper and metal. Tells how this equipment has helped many plants save money and secure profits from scrap materials. **Galland-Henning Co.**

26 **Self-Healing Floor**—An intensely interesting folder full of pictures of attractive floors showing how this type of Mastic floor covering is self-healing if cut or scratched, as well as sound deadening, resilient, easy to clean and safe to walk upon. **The Paraffine Cos., Inc.**

27 **Solders**—New pocket-size booklet describing procedure necessary to secure good soldering results. Includes suggestions on how to select the most economical and serviceable solder for various types of jobs. **The Eagle-Picher Lead Co.**

28 **Special Floor Paint**—Folder describing new developed paint for use on concrete, cement, and wood floors, which has high penetrating values, sealing and binding the surface as it dries with a hard lasting finish. Folder describes protective qualities and economy of its use for heavy service floors. **West Disinfecting Co.**

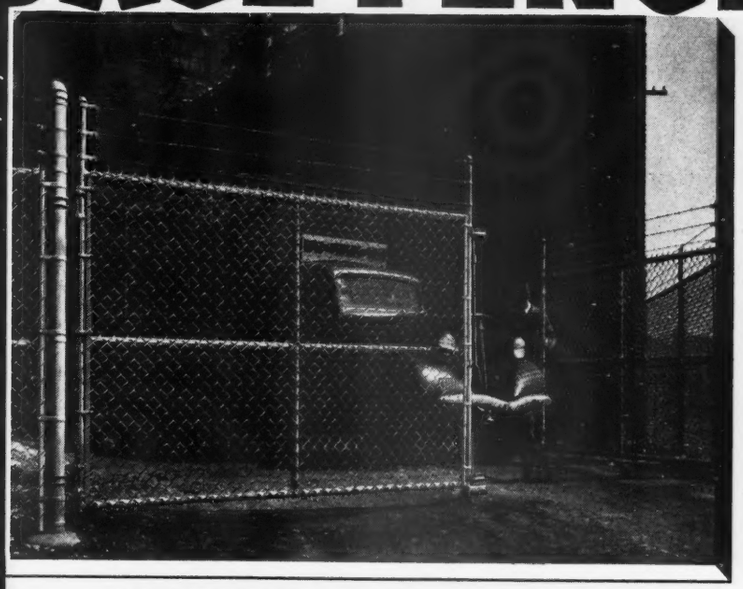
29 **Steel Doors**—36-page catalog fully illustrates a complete line of steel rolling, sectional upward acting, and other space-saving efficient doors. This very useful book contains details of construction and application. **Kinnear Manufacturing Company.**

30 **Steel Shop Equipment**—Catalog No. 331 describes steel shop tables, benches, tool stands, tool toters, cabinets,

(Continued on page 212)

PAGE FENCE

Product of Page Steel & Wire Division, American Chain & Cable Company, Inc.

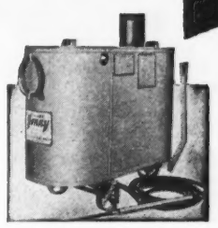


NOT EVERYONE NEEDS AN ALUMINUM FENCE

But Page not only has an aluminum fence if you do need it, but offers chain link fence in four other superior metals—whichever is best suited to your local atmospheric conditions. That's just one of many reasons why PAGE FENCE is more than a product—it is a complete fence service. You can rely on 56 years of fence service available through any one of our 92 Association Members who is near to you to render skilled, courteous service. Secure his name and free, illustrated and informative literature—write PAGE FENCE ASSOCIATION, Bridgeport, Conn.

STEP UP YOUR PRODUCTION NOW!

REDUCE MACHINE HOUR LOSSES with HYPRESSURE JENNY



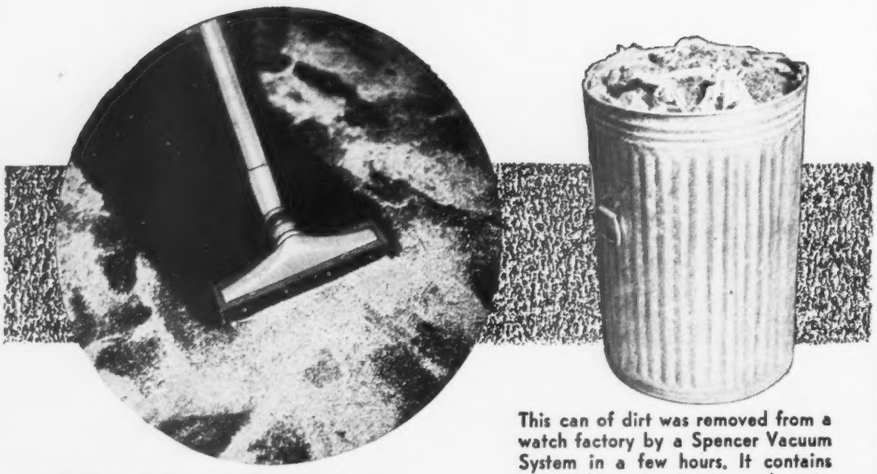
Hypressure Jenny Steam Cleaning of machinery before inspection, repair, or use, helps to prevent machine hour losses by uncovering sources of weakness—strain cracks, worn parts, etc. Also saves 25% to 40% of your mechanics' time now wasted in fighting dirt and grease. Additional remarkable savings in cleaning floors, windows, walls, lavatories, trucks, and manufactured products before painting. Find out how much YOU can save. Return the coupon for a free survey.

HOMESTEAD VALVE MFG. CO.
P. O. Box 86 Coraopolis, Pa.

We have.....men employed in maintenance.
We clean.....pieces of machinery monthly.
We clean.....sq. ft. of industrial windows.
We want to clean ☐ small tools, ☐ machines, ☐ cranes, ☐ runways, ☐ floors, ☐ walls.

Name .....

Address .....



This can of dirt was removed from a watch factory by a Spencer Vacuum System in a few hours. It contains oily sawdust, microscopic watch parts, glass, paper, lint and just plain dirt.

WHAT DOES A CAN OF DIRT A DAY COST YOU?

We mean the can of dirt you don't get—the part that is in cracks in the floors, in and under machinery, or stirred up with brooms to spread over your ceilings, walls, equipment and eventually the finished and unfinished goods.

You can figure the answer yourself. Just estimate roughly the annual worth of the following items:

A 25% saving in cost of cleaning floors .....
A 50% saving in cost of cleaning overhead .....
A 70% saving in cost of cleaning machinery .....
Saving due to reclaiming valuable materials .....
Saving by elimination of rejects due to dust .....
Value of reduced fire, explosion and health hazards .....
Saving in fuel by cleaning boiler tubes .....
Per Year Total $.....

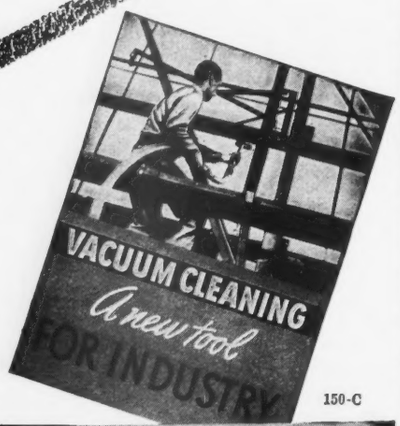
The first three percentages are representative estimates made by present users of the Spencer Vacuum System. Spencer representatives will study your plant and make a specific estimate on request.

It Adds Up

It adds up to the fact that any one of these seven items may pay for a Spencer Vacuum System in two years. If you can save on two items there's a nice profit.

A survey of 444 users shows that most plants report savings on at least 3 items.

Compare what they are doing with Spencer Vacuum with present methods in your plant. The results are illustrated in the new Spencer Bulletin. Ask for Bulletin 120F.



150-C

SPENCER HARTFORD
CENTRAL AND PORTABLE VACUUM CLEANING SYSTEMS
THE SPENCER TURBINE COMPANY, HARTFORD, CONN.

FACTORY'S Catalog Service
Section 5 (Continued)

stock handling cards, tool trays, shop desks, bar racks, small part cases and other items in a complete line of steel shop equipment. **Lyon Metal Products Co.**

31 **Suction Cleaners** — An illustrated folder, "Get Rid of Dust," showing and describing the utility of modern industrial suction cleaners of the portable type; and listing the various dust and materials that are handled effectively by suction. The three Invincible Industrial Units that are most widely used by Industry are shown and described. **Invincible Vacuum Cleaner Mfg. Co.**

32 **Vacuum Cleaning for Industry**—Bulletin 120F illustrates results to be obtained with a Spencer Vacuum System, cleaning large areas at low cost, saving in production and maintenance. Also describes Spencer Portable and Central Systems from 1/3 H.P. up, and Industrial Vacuum tools. **Spencer Turbine Co.**

33 **Vent Type Data**—A 32-page book, DS Series 332, gives typical vent-type layouts used in factory and laboratory installations, together with a complete description of Transite pipe, Class "S." Includes full descriptive tabular data on fittings and couplings, as well as information on the use of this asbestos-cement product. Compiled in data sheet form. **Johns-Manville.**

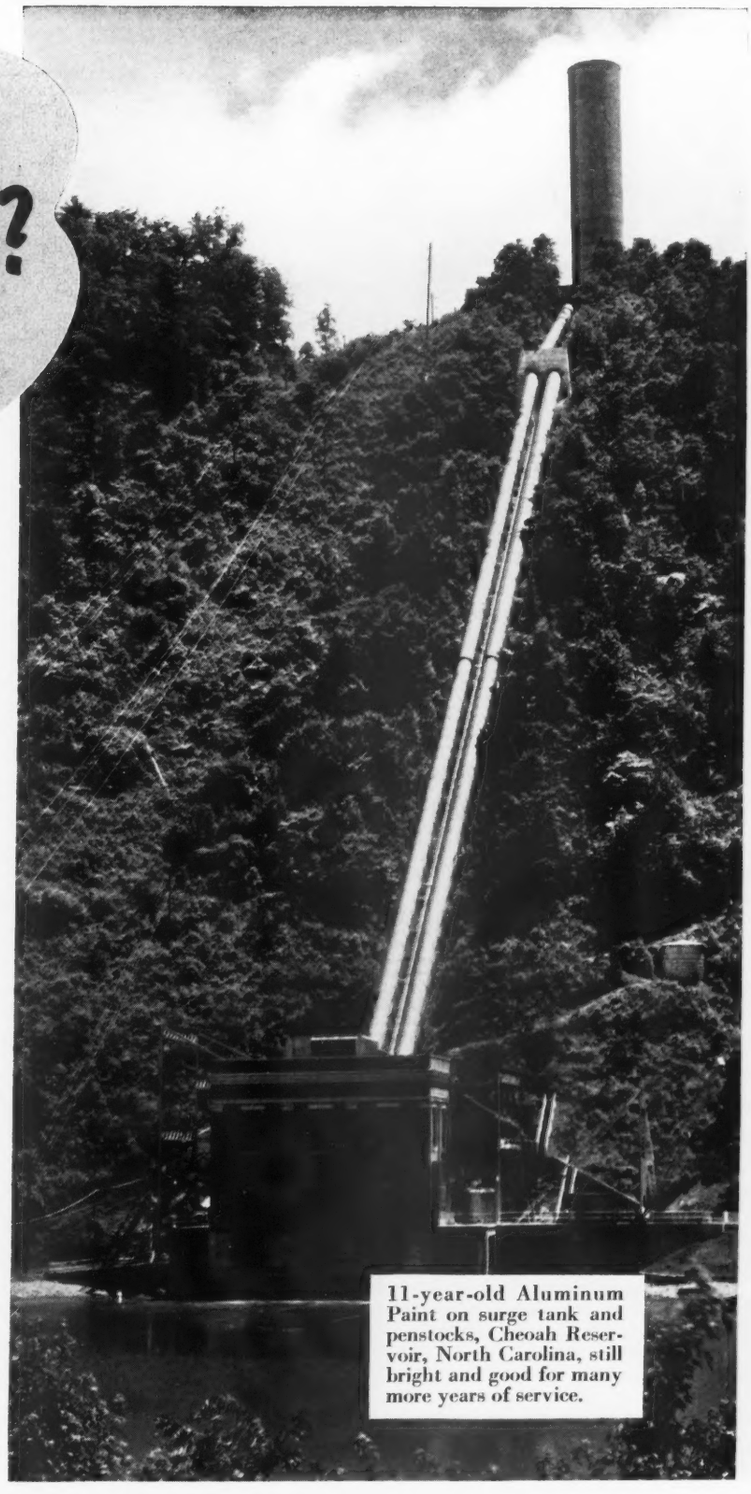
34 **Vibration Control** — A perpetual loose-leaf file covering both theory and practice of isolating machinery against vibration transmission, dealing with all types of isolators and their commercial application to all types of industrial machinery. Complete general discussion of basic vibration problems with provision for filing additional data on specific conditions and individual cases. **The Korfund Co., Inc.**

35 **Waterproof Concrete Paint**—Informative booklet describes concrete paint that is unaffected by alkalis, bonds with concrete, and provides a waterproof finish that prevents "dusting." Also describes how this paint will not crack, chip, or peel. Available in nine colors. **Asphalt Products Co.**

36 **Whenever Piping is Involved**—Fully illustrated 20-page book on Prefabrication of Welded Piping . . . dependable and economical method of meeting the exacting requirements of power and process piping, tells the story of complete facilities and installation data for various types of plants. A good reference book on industrial piping. **Grinnell Company, Inc.**

(Check numbers on coupon page 208)

How long is long life?



11-year-old Aluminum Paint on surge tank and penstocks, Cheoah Reservoir, North Carolina, still bright and good for many more years of service.

With paint, long life depends a lot on what kind of a life it leads. On the exposure conditions encountered.

In the case of the surge tank and penstocks above the shoreline of Cheoah Reservoir, North Carolina, the original Aluminum Paint has seen 11 summers come and go, and it still is hale and hearty, protecting them from weathering and corrosion.

That is not exceptional service from *good* Aluminum Paint properly applied. Nor is it, of course, a promise of how long Aluminum Paint will last on every job, because exposure conditions vary. But this job and many others *do* vouch for the exceptional durability of *good* Aluminum Paint on steel.

How long is long life? With Aluminum Paint, long enough to cut the cost of your paint maintenance considerably.

GET THIS FREE BOOK!

To get the greatest good from your Aluminum Paint, be sure to use a high quality vehicle of the proper type, with the correct amount of Alcoa Albron Pigment. Complete technical data on the correct kinds of Aluminum Paint for different services are given in this *Aluminum Paint Manual*, sent free to maintenance engineers. Write PAINT SERVICE BUREAU, ALUMINUM COMPANY OF AMERICA,* 2126 Gulf Building, Pittsburgh, Penna.

ALCOA ALUMINUM

ALBRON *Paste for*

ALUMINUM PAINT

**We make no Aluminum Paint; only Alcoa Albron Paste and Powder, the pure Aluminum pigments you get in leading brands of Aluminum Paint.*

MORE PROFITS
by less scrap loss

★ Baled scrap sells at higher prices than loose scrap . . . can be efficiently stored for better market prices.

★ Loose scrap is a nuisance in any plant . . . difficult and costly to handle; takes up valuable floor space, and slows up production.

★ Baled scrap can be shipped at lower cost. Compact bales can be loaded easier than bulky loose scrap and full carload weights mean lower freight rates.

★ A Galland-Henning baler pays for itself quickly and is a permanent money-saving asset.

BALING PRESSES

Galland-Henning Double Compression Self-ejecting Balers

Capacities: ¼ to 15 tons per hour

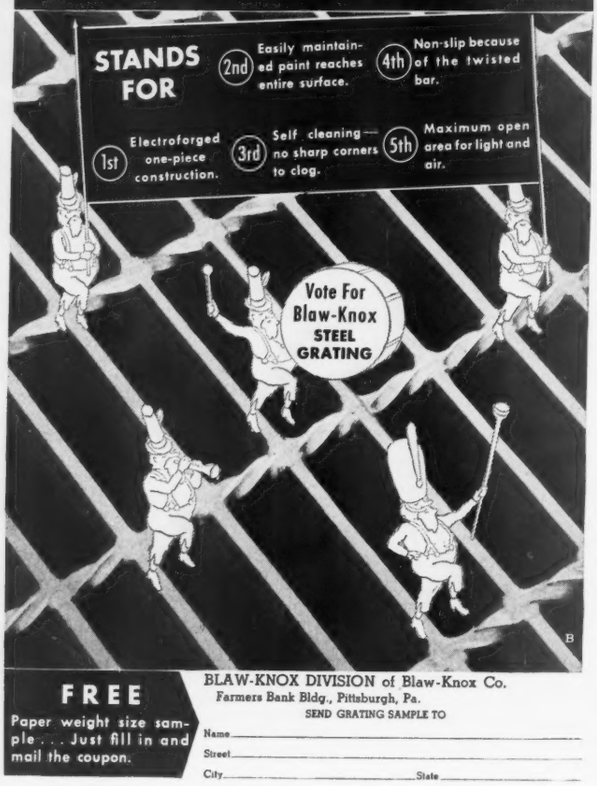
CUT SCRAP COSTS

Send for condensed bulletin on "Low Cost" Baling, just off the press.

GALLAND-HENNING MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN

BALING PRESSES • NOPAK AIR AND HYDRAULIC VALVES • AIR CYLINDERS • HIGH PRESSURE PUMPS

BLAW-KNOX *Electroforged* **STEEL GRATING**


STANDS FOR
1st Electroforged one-piece construction.
2nd Easily maintained paint reaches entire surface.
3rd Self cleaning—no sharp corners to clog.
4th Non-slip because of the twisted bar.
5th Maximum open area for light and air.
Vote For Blaw-Knox STEEL GRATING

FREE
Paper weight size sample . . . Just fill in and mail the coupon.

BLAW-KNOX DIVISION of Blaw-Knox Co.
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SEND GRATING SAMPLE TO

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See What You SAVE!

• A survey of storage and materials handling methods by Lyon Storage Equipment Engineers is much more than a check-up on the amount and condition of existing equipment. It is an accurate inventory of operating conditions . . . making possible a precise estimate where, how and to what extent modern Lyon Steel Storage Equipment will reduce (1) Production Losses; (2) Transportation Losses; (3) Storage Space Losses; (4) Fire Hazards; (5) Personal Injury Hazards; (6) Stock Loss and Damage. Write for full details on this industry-proved service and equipment. No obligation.

LYON METAL PRODUCTS, INCORPORATED
1211 River Street, Aurora, Illinois

LYON STORAGE EQUIPMENT *Service*

Strange Facts about Fire!

FIRE LOSSES IN U. S. ARE RISING!

$27,031,000 WAS THE U. S. FIRE LOSS IN **MAY, 1939** . . . AN **18% INCREASE** OVER MAY, 1938! IN FACT, LOSS FIGURES HAVE BEEN RISING FOR **4 CONSECUTIVE MONTHS.** ARE WE PAYING TOO LITTLE ATTENTION TO FIRE PROTECTION?

BIG FIRE OUT FAST!

IN A RECENT TEST 30 GAL. OF OIL AND GASOLINE BURNED OVER AN AREA OF 120 SQ. FT. A **LUX** MODEL 100 FIRE EXTINGUISHER KILLED THIS BLAZE IN **13 SECONDS!**

CLEAN, DRY, HARMLESS

THOUGH **LUX** CARBON DIOXIDE GAS IS THE **FASTEST KNOWN EXTINGUISHING AGENT,** IT IS NON-TOXIC, HARMLESS TO MATERIALS. YOU CAN SPRAY IT OVER YOUR BEST SUIT, HOLD IT ON YOUR HAND. **LUX** GAS DISAPPEARS INTO THIN AIR, LEAVING NO STAIN, NO MOISTURE, NO CORROSION.

NEW-TYPE EXTINGUISHER

AIM IT LIKE A GUN. FIRE AT THE FIRE! THE NEW **KIDDE-LUX** MODEL TWO HAS PISTOL-GRIP, TRIGGER-CONTROL FOR EASY ONE-HANDED FIRE FIGHTING. FASTEST WAY TO SMOTHER SMALL FIRES. THERE'S A PLACE FOR THIS FIRE-KILLER IN YOUR PLANT.

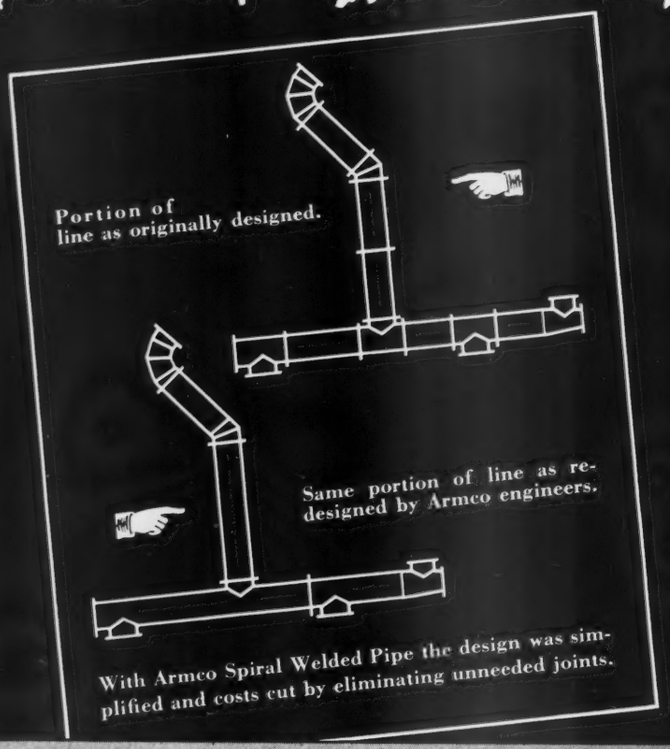
Could gasoline, paint, or chemicals cause a dangerous fire in your plant? Could you handle an electrical fire quickly, without damage to delicate wiring? On electrical and flammable liquid fires LUX extinguishers are tops!

For storage spaces, finishing rooms, large electrical motors, Lux Built-In Systems are your best protection. America's foremost utility companies, motor car manufacturers and countless industrials rely on Lux Built-In Systems for hazards like these.

Send the Coupon

Would you like to know more about fire . . . how to protect against it? Send for "Don't Play With Fire". It's free. Mail the coupon right now.

Walter Kidde & Company
1112 West St., Bloomfield, N. J.
Send me "Don't Play With Fire".
Name_____
Company_____
Address_____


Portion of line as originally designed.
Same portion of line as redesigned by Armco engineers.
With Armco Spiral Welded Pipe the design was simplified and costs cut by eliminating unneeded joints.

THIS MILL Saved $556.85 ON ONE PIPING JOB

• To cut the cost of a piping job as much as 36% seems almost too good to be true. Yet that's what one large mill recently saved by using ARMCO Spiral Welded Pipe. Here's the story:

As originally designed the pipe would have cost $1521.27. As redesigned by ARMCO engineers—using longer lengths, shop-welded fittings and fewer flanges—the cost was only $964.42.

What's more, savings didn't stop with this reduction in purchase price. ARMCO Pipe combined ample strength with light weight for easier handling and hanging. And fewer joints meant less assembly work. Maintenance is sure to be less because there are fewer potential sources of costly joint leakage.

Possibly similar savings can be made on *your* next pipe installation. ARMCO Pipe is available in diameters from 6 to 36 inches—wall thicknesses from 7/64 to ½-inch—with optional coatings. Just send us your specifications. The American Rolling Mill Company, Pipe Sales Division, 1284 Curtis Street, Middletown, Ohio.

ARMCO Armco

SPIRAL WELDED PIPE

Perpetual Equipment Show

Do you realize that leading equipment and materials manufacturers conduct a perpetual equipment show for you every month in the advertising pages of FACTORY?

In these pages they bring to you their latest available information and ideas. During the course of a year, you find in FACTORY around 1500 pages of advertising from 300 leading manufacturers.

As one reader put it—"I consider the advertising pages of FACTORY a most useful source of information on the latest developments in equipment and materials."

THE PAINT YOU'VE BEEN WAITING FOR—

A REALLY *PRACTICAL* QUICK DRYING PAINT FOR LARGE INDUSTRIAL AREAS

THESE VIALS TELL THE RICE PROCESS STORY . . .

VIAL A contains refined linseed oil as commonly used in white oil paints. Mixed with white pigments, the oil *seems* to lose its color. BUT *the yellow is still there!* Sooner or later, it will show up on your painted walls and ceilings.

VIAL B shows how the same oil appears after treatment with our secret Rice Process. It is almost pure white in color. *The yellow is removed!* This exclusive process is why we can blend synthetic vehicles with our processed oils and give you a Barreled Sunlight that (1) is whiter to start, that (2) stays white longer, (3) dries quicker, (4) spreads and hides better, (5) flows more easily.

AGAIN the famous secret Rice Process breaks paint tradition . . . brings out a quick drying form of Barreled Sunlight that shatters all standards of conventional white finishes!

This new Barreled Sunlight is *still whiter*. What's more, it holds its whiteness *even longer*. Its unmatched spreading and hiding powers save time and paint. Painters work faster because it flows much easier. It is the most practical quick drying paint today for large-area work. It offers every element for low-cost, high-quality work.

You get these advantages only in Barreled Sunlight, for no chemist can copy the Rice Process. *It defies chemical analysis.* It has kept Barreled Sunlight the leader in its field for 25 years. It is only by this secret process of treating linseed oil that newer synthetic types of vehicles can be combined to produce such an outstanding finish. For this reason, Barreled Sunlight is now more than ever the one white paint that other laboratories try to equal.

For complete information, write for a free copy of "More Light with Lasting Cleanliness." Address U. S. Gutta Percha Paint Co., 2-K Dudley Street, Providence, R. I.

BARRELED SUNLIGHT

WHEN ORDERING, PLEASE SPECIFY "QUICK DRYING FORM"

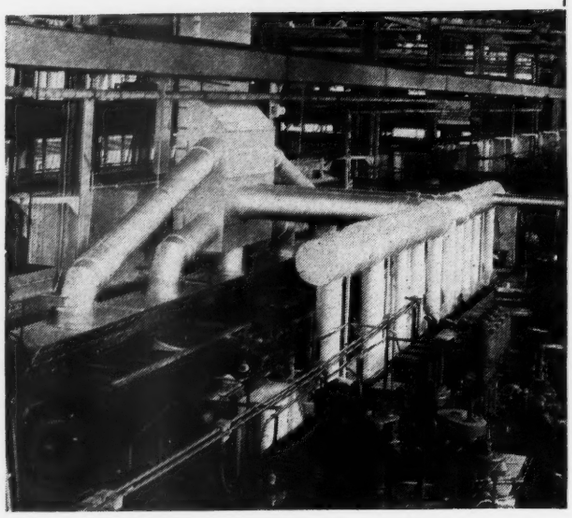
KEEP INSTALLATION COSTS LOW

WITH THIS DURABLE CUSTOM-MADE VENT PIPE

HERE, for the first time, is a material specially built to save in industrial venting service . . . J-M Transite "S" Pipe. Light in weight and easy to handle, it is "custom-made" in long, 13-foot sections. Longitudinal seams are completely eliminated . . . joints are exceptionally tight and easily assembled. A complete line of fittings makes installation fast and economical, even in cramped working areas.

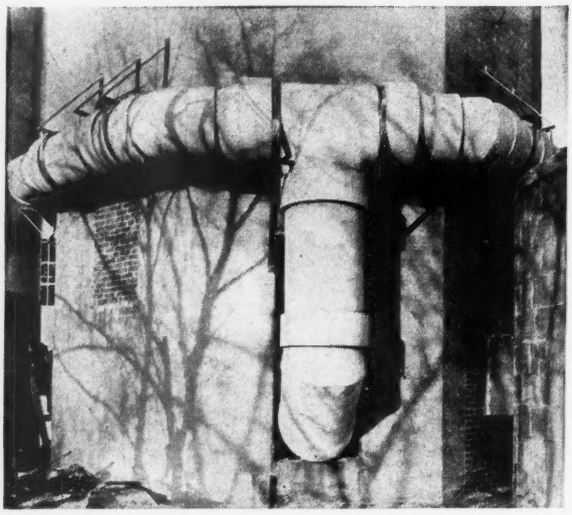
After installation, Transite "S" Pipe offers still more savings. Its asbestos-cement composition provides great durability, uniform strength and unusual resistance to corrosive gases, fumes, vapors and dust. Installations of Transite "S" Pipe all over the country, in a wide variety of industrial services, are providing maximum assurance of long life, low maintenance and high efficiency.

Considering these advantages, the cost of Transite "S" Pipe is surprisingly low. It will pay you to get full details. Send for Engineering Brochure DS-336. Johns-Manville, 22 East 40th Street, New York, N. Y



PROCESS FUMES are handled economically in this J-M Transite "S" Pipe system. Made of asbestos and cement, Transite offers high resistance to corrosive fumes, gases, vapors and dust. Efficiency stays high, costs low, throughout years of service.

WEATHER OUTSIDE, corrosive industrial fumes inside, have little or no effect on the Transite "S" Pipe stack pictured here. Strong and durable, this asbestos-cement vent pipe assures years of virtually maintenance-free operation.



SEWAGE-DISPOSAL GASES are vented by J-M Transite "S" Pipe on the job shown above. Transite's light weight, ease of handling and complete line of fittings make installation in such difficult locations simple, rapid and economical.

Johns-Manville TRANSITE "S" PIPE

FOR PERMANENT, LOW-COST INDUSTRIAL VENTING SYSTEMS

PLANT OPERATORS are amazed at the tremendously stepped-up hiding power of the new DULUX High-Hiding Mill White. They have found that many paint jobs which would normally require two coats can now be done with one.

And that proves that DULUX can save *you* time and money. You buy fewer gallons of paint . . . application costs are lower . . . one coat takes less time to apply than two . . . your plant is idle for a shorter time. In cases where the present finish is very poor, a priming undercoat may be necessary.

Whiter at the start, it stays whiter and is more durable—this new High-Hiding DULUX means long-run economy. It saves money on overhead because it needs *fewer* repaintings. Send in the coupon.

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E. I. du Pont de Nemours & Co. (Inc.), Dept. FM-119
Finishes Division, Wilmington, Delaware

Please see that I get complete information about DULUX High-Hiding Mill White—and your new booklet.

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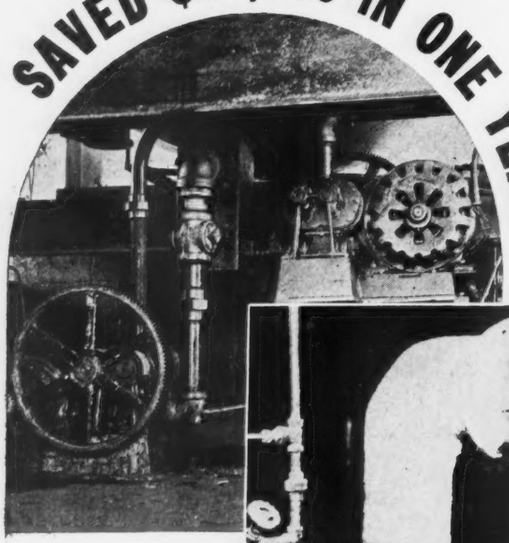
These Companies CUT COSTS TOO!

SAVED $35,000 IN ONE YEAR



↑ In this plant 5 pumps had to be replaced every 16 hours. New ROPERS were installed on this job and were not repaired or replaced for 13 months.

TWELVE YEARS pumping hot tar is the service record of the ROPER at right above. Operating 24 hours per day it has pumped over 100,000,000 gallons of asphalt at 400° F.

FOR FURTHER INFORMATION SEE OUR CATALOG IN SWEET'S

Write today for our new catalog "F-1" and get full information on pumps in sizes 1 to 700 gpm and for pressures up to 750 lbs. GEO D. ROPER CORPORATION, ROCKFORD, ILLINOIS.

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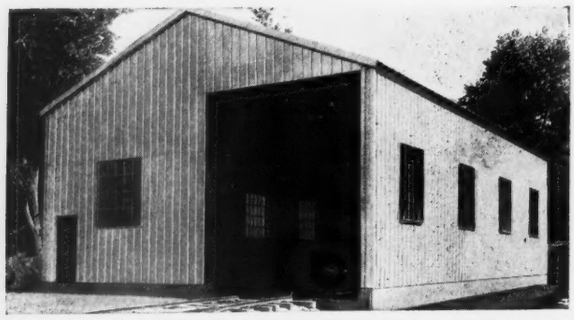
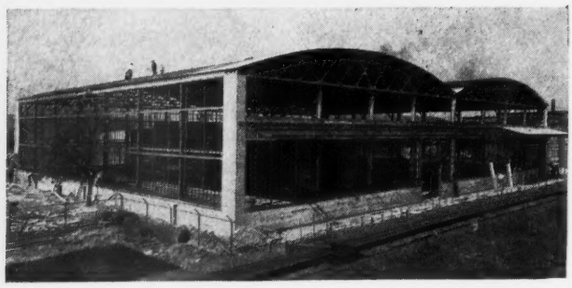
Rotary PUMPS

DO YOU NEED A NEW BUILDING?

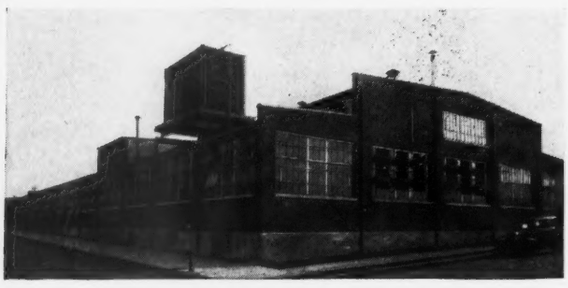
International Can Supply It— Quickly—and at Less Cost



• ALL-STEEL — From its vast stock of standardized steel building materials, International supplied all of the steel for this 40" x 80" machine shop, including galvanized beaded siding and roof sheets.



• MASONRY AND STEEL — Clear-span bowstring trusses, structural steel, steel sash and steel roof sheets for this warehouse (above) and this industrial plant (below) were supplied by International.



Save *time*—and *money*—on your new building! Take advantage of International's vast stock of standardized steel building materials—and International's rich engineering experience.

Just send us a rough sketch of your proposed building. Indicate its size and the location of doors and windows. Tell us what the building is to be used for, and whether it is to be all-steel or masonry-and-steel.

Without obligation to you, our engineers will promptly submit complete plans and quotation for your approval.

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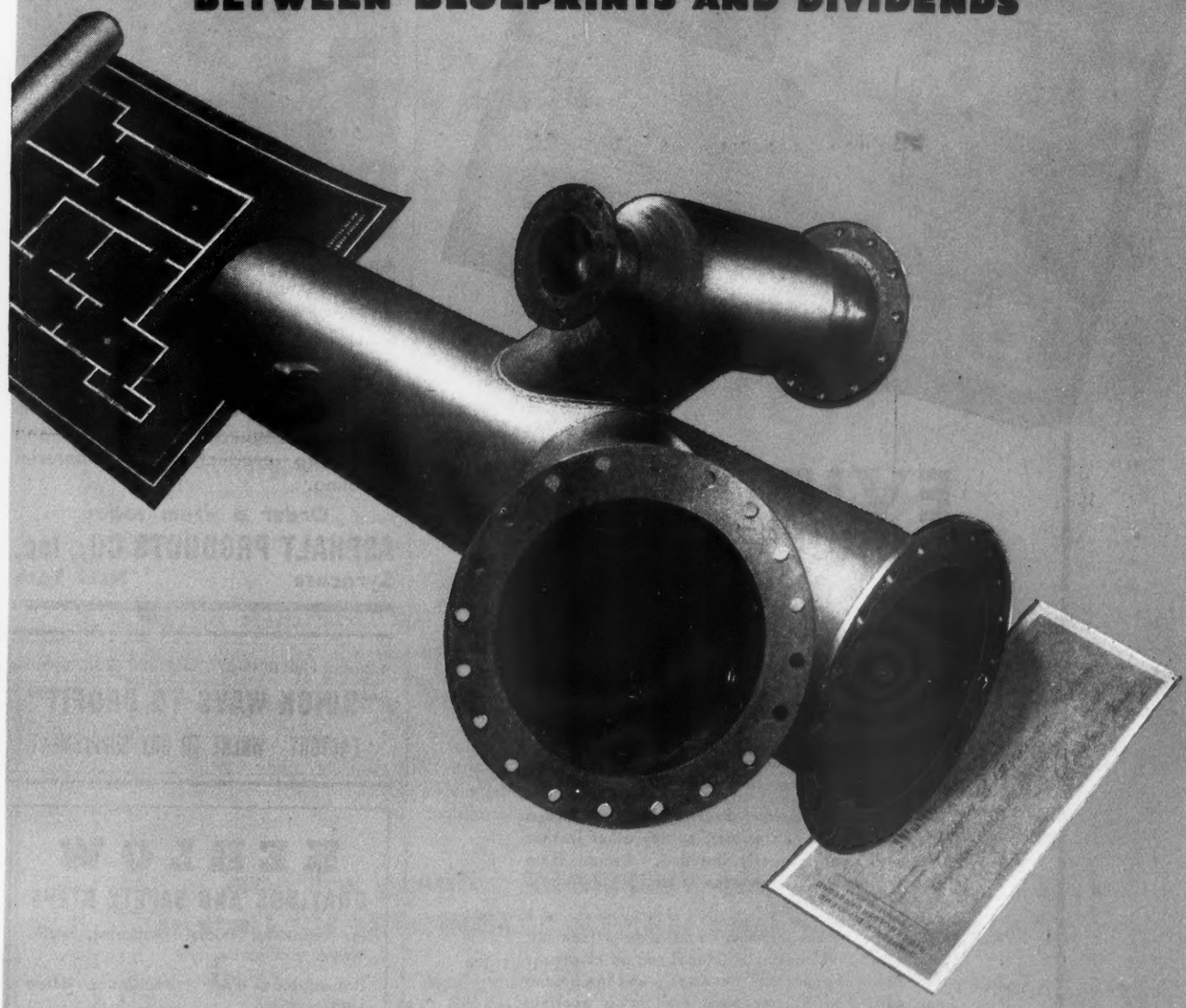
INTERNATIONAL STEEL COMPANY

1347 Cleveland Ave. Evansville, Ind.

Shortest Bridge

BETWEEN BLUEPRINTS AND DIVIDENDS



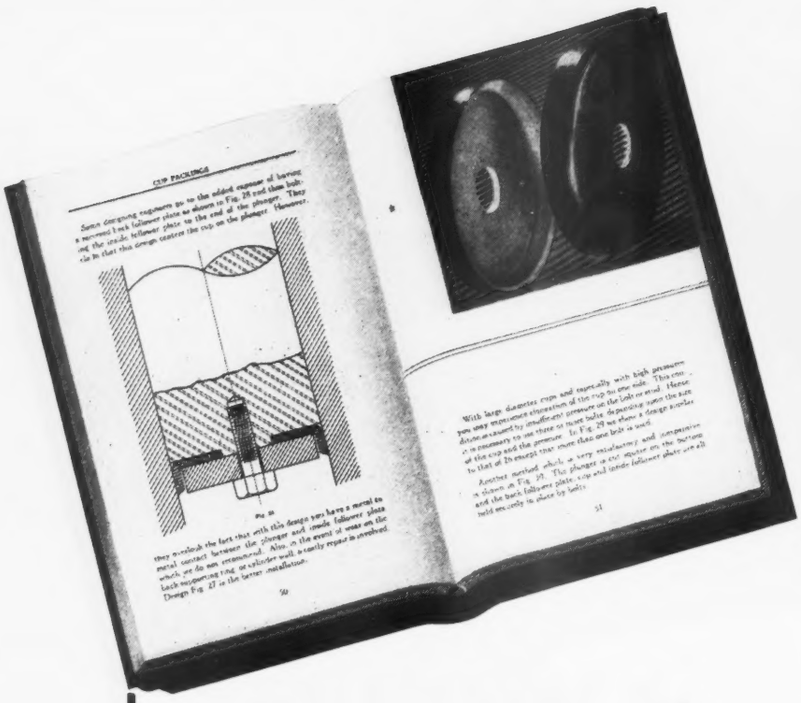
YOUR money begins to flow *out* when you start your new plant or modernization. But it won't flow *in* again until the job is finished and running.

Grinnell Prefabrication can cut days and weeks off the time between investment and return. Accurate sub-assemblies like that shown are simply and rapidly field-welded into a finished piping system.

Grinnell plants are strategically located to serve the continent quickly. For piping that's an exact interpretation of your plans, pre-tested to qualify for insurance, and constructed to standards commercially practical and technically sound, "Give the plans to Grinnell." Grinnell Company, Inc., Executive Offices, Providence, Rhode Island. Branch offices in principal cities.

PREFABRICATION BY **GRINNELL**

WHENEVER **PIPING** IS INVOLVED



EVIDENCE!

It takes a "heap of knowin' " to be able to compile a book like this one—now coming off the press.

Its contents, covering every phase of leather packing engineering, are prima facie evidence that Houghton knows whereof it speaks. And why shouldn't it, when you consider the 40 years of experience . . . the leadership in both volume and quality in this leather packing field?

Remember, VIM Leather Packings are guaranteed to last at least twice as long as any other leather packings, when properly installed. Behind them is a generation of experience in design, impregnation and manufacture.

That's why we feel entitled to issue more than just a catalog. We term it a "Handbook on Hydraulic and Pneumatic Leather Packings", and we'll send one copy free to any plant man using packings and asking for it on his firm letterhead.

And while you're writing, ask us to quote or advise you on some leather packings you may be using regularly. You'll be pleased by the service you get.

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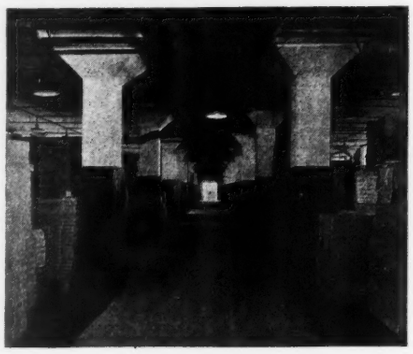
VIM LEATHER PACKINGS

Safe, Smooth Traffic Aisles and Floors with HYDRO PROOF



Any broken, cracked or worn concrete, brick or stone floor can be made to give many years of extra service. At slight cost and with a few hours' work by your workmen, the expense of a new floor can be prevented. Patching or resurfacing with Hydro Proof will prove a safeguard to employees and speed up production and material handling.

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for industrial floors, platforms, walkways, and stairs.

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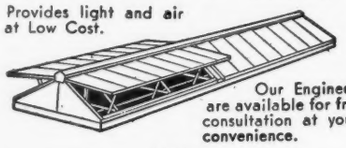
Provides light and air at Low Cost.



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FOR DESCRIPTIVE LITERATURE

STEEL CONSTRUCTION

gives

"HALLOWELL"

WORK-BENCHES

Pat'd and Pats. Pending

Fig. 732—"Hallowell" Steel Work-Bench. Drawer is extra.

3 BIG ADVANTAGES

1. Smooth Working Surface

The sturdy steel tops won't splinter, split or crack. They'll give years and years of use and stay smooth as surface plates. They're husky enough to withstand heavy loads and ideally smooth for precision jobs.

2. Lasting Rigidity

Heavy flanged steel leg construction assures you permanent stability. It enables you to be sure of always having a steady working surface. Years of hard service cannot cause "Hallowell" Benches to rock or get wobbly.

3. Easy Movability

"Hallowell" Benches are so constructed that they are easily and quickly taken apart for moving to new shop locations. They can be re-set-up strong, sturdy and good as ever. Just try that with a wooden bench and you'll have only a pile of kindling. Two or more "Hallowell" Benches can be joined end to end to provide a long continuous working surface whenever desired.

There are over 1300 different "Hallowell" Bench combinations available so you can can be sure of getting just what you want. All are exceptionally low in price and can be shipped promptly. Write for catalog.

. . . and for greater ECONOMY and CONVENIENCE install "HALLOWELL" STEEL SHOP EQUIPMENT

"Hallowell" Steel Tool Stands

Fig. 705

Moves easily wherever it's needed; a handy stand to have. Made in a variety of types for all purposes.

Send for "Hallowell" Shop Equipment Bulletin

"Hallowell" Steel Stools

The one piece welded steel construction of "Hallowell" stools and chairs makes them last longer — an important item when you're considering profits.

You can get just what you need in a "Hallowell" for the line is most extensive, with a design adapted for use at any type of operation.

Write us for our catalog.

Fig. 1334
Pat. Applied for

"HALLOWELL" FOREMAN'S DESK

Ideal for foreman's use. Right height . . . right incline to write on while standing. Large drawer with lock for holding valuable papers. Carried in stock for prompt deliveries.

Fig. 981 Pat. Pending

STANDARD PRESSED STEEL CO.

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IT PAYS TO REGULATE "AIR TRAFFIC" in YOUR PLANT

"Proof of the Pudding" . . . In a Textile Plant

The Wade Manufacturing Company of Wadesboro, North Carolina, a large textile plant, recently installed a Gardner-Denver RX Compressor for a humidifying system. Compressor operates at 300 r.p.m. driven through V-belt drive by a 60 horsepower motor. Actual air delivery is 492 cu. ft. per min. at 35 lbs. pressure. The compressor is operating 8 hours a day for 5½ days a week and is frequently subject to double time. "We are perfectly satisfied," say the owners, "with its economical and dependable operation."

With this Money-Saving GARDNER-DENVER RX COMPRESSOR

Regulate the "air traffic" in your plant —assure a smooth, unfailing flow of compressed air in exactly the right volume for your needs at any hour of the day . . . with a Gardner-Denver RX Air Compressor!

The Duomatic Control, which is unique and which may be had *ONLY* on Gardner-Denver compressors, automatically adjusts air supply to air needs. With this control, if the air requirements are above 50% of the compressor capacity, the compressor will run at constant speed with suction valve unloading. If the air demand falls below 50%, the control will automatically switch over to start and stop; thus the compressor will always operate in the most efficient manner regardless of the load and without requiring the attention of an operator.

In other ways, too, the RX Compressor stands as the guardian of your budget. Owing to its advanced design, it delivers a larger air volume with remarkably low horsepower per cubic foot of air delivered. And it has the *exceptional* dependability you need to keep air supply constant. Before you invest in any air compressor, find out all about Gardner-Denver RX Compressors. Write for Bulletin HAC-40. Gardner-Denver Co., Quincy, Illinois.

GARDNER-DENVER 80th ANNIVERSARY YEAR

Production Planning and Control

in the cost-reducing program

WITH MILLIONS INVESTED in machinery and equipment, the job of planning and controlling production assumes major proportions.

The old way was to toss the order to the foreman with a few vague instructions as to when it was wanted and leave it to a horde of stockchasers to get it out.

The new way is to know exactly what the plant can do down to the last man and machine, then work out every move from front office to shipping room door.

Which naturally means paperwork. But there's a difference between old-fashioned red tape and new-fashioned control.

The one takes much clerk hire, produces only post mortems.

The other uses the latest and best in mechanical methods and business machines. It employs Gantt chart principles in scheduling, visual control methods, teletypewriter or loud-speaker communication between control stations.

More often than not it uncovers a further need for mechanical handling equipment to assure the steady, smooth flow of production so essential to economical operation and low-cost production.

And lower production costs, passed on to the customer in the shape of lower prices, mean more sales, more jobs, more profits.

WHAT TO DO

SUGGESTIONS THAT POINT THE WAY

Survey the advantages of centralized planning and control.

Do we know time required for engineering, purchasing, fabricating, assembling, testing, shipping?

Check steps taken in filling orders with a view to simplification.

Consider the substitution of mechanical for manual methods of preparing factory paper.

Question all paperwork. Is the foreman a manager or a clerk?

Study the applicability of Gantt chart principles in scheduling.

Investigate the advantages of loud-speaker or teletypewriter communication between control stations.

Consider the advantages of perpetual inventory methods, standard costs, flexible budgeting.

Study waste elimination procedures.

Can we shorten manufacturing cycles through use of modern handling and production methods?

Consider visual control boards, machine and work station loads.

Study economical production runs with a view to avoiding unnecessary set-up changes and high in-process inventories.

QUICK WAYS TO PROFITS

THE LETTER THAT SAVED $25,000 A YEAR

THERE was that stack of mail demanding his attention, and he with a thousand things to do. He reached testily for the first letter in the pile—"Another ad . . ."

The letter was half-way to the waste basket when a phrase caught his eye—"higher taxes, increased labor and material costs . . . greater profits." It didn't make sense.

Still incredulous, he read the letter through. Then he grudgingly filled out a return postcard—tossed it into his mail basket.

The postcard called for a free survey of his plant . . . to show where operating costs could be reduced. The survey was made. And as a result of it, automatic controls were installed throughout the plant.

A year later he was reporting to the board of directors: "Gentlemen, those Taylor Automatic Controls we installed as a result of their survey saved us this year exactly $25,347."

* * *

THIS STORY is typical of the way Taylor is helping industry to overcome the problems of today—the problems of higher taxes, of increased material and labor costs.

For Taylor shows you how to attack the one cost which you can reduce—operating cost.

Taylor Automatic Controls can insure the uniformity of your product . . . can reduce spoilage and speed production. This means more sales and greater profits for you.

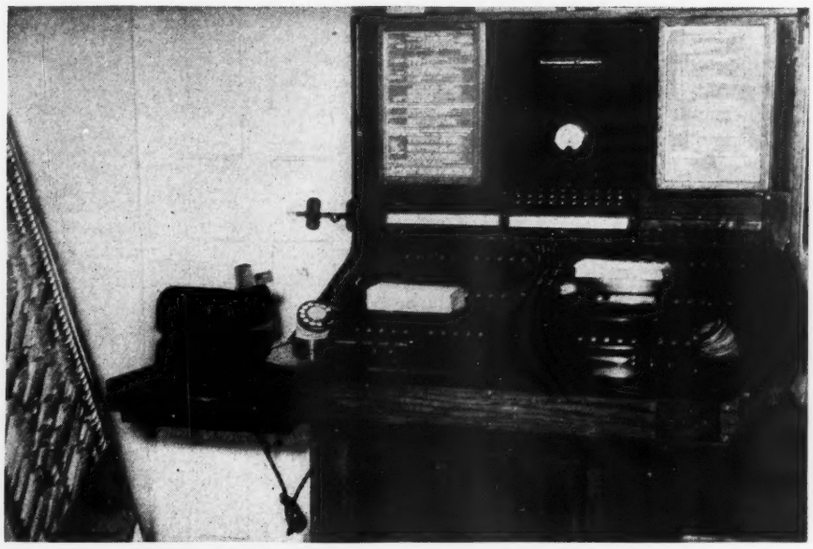
Write today for a Taylor man to make a free survey of your plant. No obligation, of course. The Taylor Instrument Companies, Rochester, N.Y. Plant also in Toronto, Canada. Manufacturers in Great Britain: Short & Mason, Ltd., London, England.

Taylor

Indicating | Recording • Controlling

TEMPERATURE, PRESSURE, FLOW *and* LEVEL INSTRUMENTS

Dialing the Data



With this dial system, three men control production better than 17 timekeepers

Automatic signaling equipment plays a big part in a combination cost-and-production control set up by a gear manufacturing concern. With this system and 3 good production men it now has better control than it formerly had with 17 department timekeepers.

When an operator is ready to start a job he steps to a dialing station and signals the production clerk, who sits at the central control board, dials his number, number of the job just completed and quantity made, number of job he is just starting, and number of machine. The production clerk enters the data and time on a time card, then turns to his visible file of jobs in progress to see if time taken on the job just completed corresponds with the time allowed. If not, he reports at once to the factory manager. He also reports to the factory manager if the operator's dialed report shows that he is working on the wrong machine, or that the order has been incorrectly routed.

The production man enters the information he receives on the back of his file copy of the production order, this posted data serving as both a cost summary and progress record.

**Inspector Goes to Job*

To overcome delays, reduce inspection costs, and catch errors at the earliest instant, a portable inspection table was designed, which the inspector could roll from machine to machine. Small finished parts are thrown directly into a hopper mounted on this table, and from this hopper they slide by gravity to a small opening and thence onto the inspection table.

Here the inspector can examine and dispose of the satisfactory parts merely by shoving them to the right where they fall through an opening to a tote box placed on a shelf below. This shelf has room for a number of tote boxes which can be stored as filled, and left at the stockroom as the inspector passes it on his rounds. The inspector has pads and pay cards on the front of the hopper, on which he records his findings. These serve as payroll data.

Much time has been saved and effort reduced by this procedure. Best of all, the operator knows he is getting his own work examined and his own returns.—*George A. Hilbert,* Industrial Engineer, Forstmann Woolen Company, Passaic, N. J.

*Charge-Back System Cuts Scrap Costs

Any item scrapped at the end of a production line has cost the company just as much as a perfect article. It is advantageous, therefore, to have the product scrapped at the first point its defect can be detected. Many manufacturing departments are paid on the basis of the output to the next point of operation, thus placing a premium on the passing along of possibly defective items.

In order to defeat this idea and prevent further expenditures on an article definitely defective, the idea of making scrap a charge-back serves to cut costs.

It works this way: When a department scraps an item before working on it, a charge is made against the previous operation. This charge will be higher than it would have been if the previous operation scrapped it, because it has absorbed more processing cost. This makes it worth while for the men to scrap any bad items at their own operation, thus reducing the cost of handling scrap. It also makes the men observant of the product's quality as it passes their operation.

This plan reduces the quantity of defective material that reaches the final inspection only to be thrown out as scrap, and it saves the expense of sending a bad article through the entire line.—*J. R. Evans,* Accountant, Armstrong Cork Company, Millville, N. J.

**Circle Delivery Cuts Storeroom Costs

Our intention was to have maintenance repair parts supplies ordered from stores by telephone, and thus eliminate loss of time to and from jobs, and at the storeroom window. An investigation disclosed, however, that an average of 142 trips were being made to stores each day, with an average time per trip of one-half hour, while less than 50 orders were placed by telephone. The time lost this way was reported as a part of the cost of each individual job and was not recognized as a storeroom charge.

We decided to combine our stores and use a circle delivery system. The route of the circle delivery was decided upon, and regular stations at which the trucks would stop were established throughout both our plants. Deliveries were to be scheduled to stations ordering material by telephone or intra-plant mail, but stops for pick-ups would be made only upon signal from the sta-

✦

Tool inventory was cut in one plant by studying number of withdrawals for each class of tools, then setting minimums to be carried in stock. Inventory in one class was reduced in this way from $4,080 to $1,500.

tions. A study of the number of stations needed, and the routes, indicated 20 stations with a route of 2.7 miles requiring 28 minutes' driving time in one plant. Allowing for all stops and loading time, we established 1¾ hour as the standard time for the trip. The route at the other plant covered 2.9 miles with 19 stations requiring approximately the same time. Allowing 7 minutes each way to cover the distance of 1.9 miles between plants, we decided on four deliveries, using two trucks.

In addition to the two trucks operating on the regular route, we assigned a pick-up truck which would be under the immediate control of the central stores and available at all times.

We next estimated the cost of combining the stores and cribs and found that the savings derived from the combination would pay for these expenses in one month's time.

The management approved the plan and we now have a central storeroom and delivery system which, to date, has proved much more satisfactory than the old method, eliminating loss of time and resulting in the desired control. —*J. L. Wood*, Manager, Maintenance Costs and Standards, Michigan Alkali Company, Wyandotte, Mich.

Speeds Orders to Shop

Chain Belt Company, Milwaukee, manufactures conveyor belts, concrete mixers, industrial pumps and other construction equipment. Practically all are custom built.

Upon receipt of an order, the engineering department analyzes it by subassemblies to determine the parts required. Each part must then go into production, necessitating the writing of production orders.

They were originally prepared by hand, and the finished order often required several hundred different parts orders, each requiring several writings. It often took from 36 to 40 hours to get an order into the shop.

Some years ago the company switched from longhand preparation to a gelatin system. A single master was prepared for each order, and all copies were made from the master. Thus orders were in the shop within a few hours. In addition, errors caused by rewriting were eliminated.

But most parts are manufactured over and over again, so it was necessary to make a new master for each repeat order. Fully 95 per cent of the data on the master were constant, which meant that the same data were written again and again.

Now a master card is typed for each part number, showing all constant data. Masters for several thousand parts are filed by parts numbers.

When an order comes in, a material list is prepared for each sub-assembly, showing the quantity of each part required. The clerk takes the first item on the list and removes the master from the file. Then he types a variable master which shows order number, item and quantity. From the two he reproduces shop order copies (the number depending on the number of departments affected), schedule board copy, move ticket, route tags, labor tickets, stores requisition, and stores receipt.

Since not all these cards require all the information, the duplicating machine has a movable block-out that makes it possible to pick up the description of a single operation on a card.

Advantages include elimination of manual rewritings, checkings, and errors. Orders get into production much more quickly. Production order routine is under centralized control. And it all costs less than it used to.

Budget-Chart Does It

To make supervisors cost-conscious and encourage them to cut costs, one organization sends a monthly statement to each department head in the form of a Gantt chart, showing budget allowance for each type of expense and actual expenditures. The chart gets the comparison home quicker than figures alone would.

Tool Breakage Drops

Although an Eastern steel mill had a tool control system that was well-nigh perfect, the physical characteristics of its toolroom storage equipment were the cause of heavy breakage and damage losses.

To conserve floor area, 11-ft. shelves had been installed. Stockkeepers thus had to use ladders. Dropping tools was a common occurrence.

By adopting a more compact type of steel shelving, bin heights were limited to 7 feet, without increasing the floor area of the toolroom. No ladders now, and damage from droppings dropped abruptly.

*Gets Out Shop Orders 8 Times as Fast

There are only 8 hours in our factory day, and up to a year ago one of our production department clerks spent all 8 of those hours typing factory work orders. Today she does the same work in just 1 hour.

Our company makes cardboard window displays, counter stands, and other forms of display advertising, and each order presents an individual problem. To give the various office and factory

CALIPER GAGES SAVE $8,000 ON ONE JOB

Each one of 4,000 valves of various sizes had to be checked for correct dimensions at 64 places, making a total of more than 250,000 measurements to be made. Checks of this sort had previously been done with ordinary calipers. But with this large inspection task ahead, seven caliper-type dial indicator gages were purchased. Use of these seven caliper gages brought an actual saving in excess of $8,000, thus returning first cost on the first job and paying a dividend ever since

*Duplicator Saves 60%

Direct-process liquid duplicating machine cuts cost of preparing factory paper

Our former method of preparing production orders was a lengthy and expensive process. Clerks wrote some longhand and, where practical, the hectograph method was used with a gelatin roll duplicating machine. In this process a master may be used only once, and since our line consists of over 4,500 items, involving thousands of parts, a number of clerks were kept busy, and considerable detail work was necessary in preparing production orders.

The new method we have adopted makes use of the direct-process liquid duplicating machine. With this process, master forms may be filed and used over and over again to make up to 500 legible copies. All our production order forms were redesigned for use with this process.

Masters and duplicating forms were so designed that all variable data such as order number, quantity, standard time, scheduled dates, appear on one side of the forms. All information that remains the same for successive orders for the same product, such as department designations and routing, goes on the other and larger side. These data are placed on the master form. Then, when a specific order is made out, a strip containing the variable data is made out and attached to the master. The two are run through the duplicator together, reproducing all the information on as many copies as desired. Once the master head is prepared, copies can then be turned out in very little time.

These masters are also used to prepare other forms besides the production order. Among these are the group bonus record, time standards and instruction card, board ticket and inspection record, and move tickets.

We also make a master for the material list in the same way. All requisitions are run off from this master, also time tickets and detail sheets for individual operations. These detail sheets we used to blueprint, but the new process was proved to be more economical.

The duplicating machine has a special keyed feed tray with push button stops. The forms are keyed to the stops so that we can single out any individual item on the master and block it out when we do not want the data on the copy.

This system of duplicating shop papers has saved us 60 per cent in clerical labor, and all orders are in the shop in less than 24 hours after receipt from the customer. Formerly, orders were delayed from one to two weeks. On more intricate items over seven hours were required to complete all the paper work which is now done in half an hour.—*S. R. Teranes*, Industrial Engineer, Hamilton Manufacturing Company, Two Rivers, Wis.

**Saves $1,040 a Year in Recording Time

On processing jobs, savings can be made in the cost of recording temperature, pressure and time by scheduling operations properly.

For one product a processing period of 120 hours for each of three tanks was required. During the processing period only temperature, pressure, and time recording were necessary. A handling or drafting time of 24 hours for each tank was also required.

With the factory operating on a five-day week, the natural procedure was to complete the handling or draining operation in these five days, and to employ an operator to make recordings over the week-end.

A study of these operations showed that if the handling and draining operations were performed during the two days the factory was closed, the recording could be done on the five regular working days by regular shift employees who were working on other similar operations.

The study resulted in an actual savings of $20 per week, or $1,040 per

departments the requisite information necessitates an elaborate work order. Because the order is complex, corrections and erasures in the original draft are common, and consequently this original draft is best made in pencil.

Under our old system three duplicate copies were typewritten and distributed to the plant superintendent and to the accounting and shipping departments. Each factory department received an individual job ticket covering only the portion of the work it was to perform. All this duplication meant red tape and overhead, increased possibilities for error, and more than a day spent in office routine. Today, in a single writing, we accomplish more than we did previously in three.

We have a new production order form which the production department fills out with a duplicating pencil. The pencil marks can be erased and changed if corrections must be made. Enough copies of the order are then made on a standard gelatin roll duplicating machine, to give a complete copy of the order to every office and factory department that will do work on it. Any confidential information which is not to appear on certain copies is blocked out by laying a strip of thin pyralin over that portion of the gelatin roll which is not to be duplicated.

Most copies of the order have printed forms on the back that can be used for recording production information. The rear of one form serves as a cost ticket, another as a record of shipments, and a third as a billing record.—*P. E. Haggerty*, Assistant General Manager, Badger Carton Company, Milwaukee.

year, in the processing labor required. —*Don Z. Decker*, Cost Clerk, Wilson & Co., Inc., Oklahoma City.

New Standards Save 20%

A manufacturer of forged tools found that in the attempt to put out a first-class product he was insisting on better quality standards than necessary in his early operations.

In rough polishing operations employees were trying to produce perfect work. But the scratches and slight scale holes they spent so much time on did not affect the quality of the product, and would either be eliminated in later operations or covered with paint in the finishing process.

Time studies were made to determine whether it was cheaper to have employees work in their present way, or speed up, work with less precision, and go back and correct pieces that came too far from standard. The studies showed the optimum to be higher speeds that would maintain an average 30 per cent of perfect output.

Quality standards were slackened, and the costs of the rough polishing operation have been cut 20 per cent.

Makes Factory "Paper" at Lower Cost

A general-purpose duplicating machine that was substituted for a single-purpose ticket-printing machine is providing Lepman Bros. Company, Chicago manufacturers of millinery, with production and payroll information at a big savings.

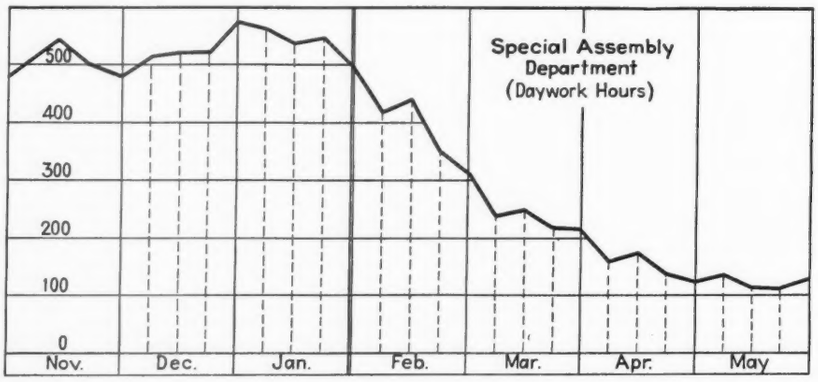
Over 500 patterns are currently in this concern's line. Some 300 production orders have to be written daily.

The old machine had to be rented; the new was purchased outright for $215. Depreciated over a 5-year period, it cost less than $4 per month. This item alone resulted in a savings of over $350 a year over the rental of the old equipment.

Whereas the old machine printed tickets from hand-set type bars, the new one works from master cards. This accounts for a clerical saving of 4 hours a day.

The new ticket is smaller—a 30 per cent savings. Also, the new machine completes the tickets in less time, since there is one copying operation in place of two operations required by the ticket writing machine.

Add the advantage of flexibility. Price changes are made easily on the new cards; with the old equipment, it was necessary to remove and reset type bars. Last, the new machine finds many other profitable uses; when it was not being used to print tickets, the old machine simply stood idle.



This is what predetermined rates did to daywork hours in an assembly department

**Cut Daywork 75%

Proceeding on the theory that it's often the little things that count, our company recently made a study of its daywork account, particularly as it related to departments working on incentives. Result: A policy of predetermined time values.

The analysis showed that 8.6 per cent (60,000 hours) of total productive hours were spent on work for which no piece rate or incentive had been set. It appeared that tasks performed on a day-work basis by incentive workers, especially for short periods, required from 40 to 50 per cent more time than tasks performed regularly on incentive. We were willing to acknowledge the psychological reason for this, but we still felt that 40 per cent of an accumulated 60,000 hours was a matter we ought to do something about.

In our special assembly department, for example, where some 40 girls are engaged in a wide variety of hand operations and where the intermittent daywork was especially noticeable, we adopted a plan of predetermined rates through the development and introduction of charts and graphs, sliding scales, tables for direct reading, and catalogs of unrelated elemental time values. See figure for results.

Although the details of our solution to the problems in other departments were different, the results were substantially the same, in that our total daywork hours were reduced from 8.6 to 2.2 per cent—a 75 per cent cut. The exact monetary value of this we do not know, but have convincing reasons to believe that it approaches the four-figure mark monthly.—*George S. Hulse*, Supervisor of Time Study, F. W. Sickles Company, Springfield, Mass.

**Simple Forms Control Inventory and Output

A set of forms designed to record production in a gray-iron foundry show both consumption of materials and the recovery of iron in its various forms.

There were no adequate reports for foundry production available, so it was necessary to lay out the complete set. It was necessary to make forms both complete in design and simple in operation, so that foundry clerks could follow them with a minimum of instruction.

Control begins with the daily heat report, which is a balance sheet covering a specific day's heat, recording the materials charged and the recoveries of materials. A detailed monthly summary of each daily heat report can be compiled, enabling the accounting department to arrive at monthly consumption of materials and recovery of this material. Our foundry superintendent insists that a duplicate copy for each heat be sent to him in order to control the amount of scrap, the amount of metal wasted in the pouring of gates and risers of too large a size, or in overflow, excessive pig bed, and cupola drop.

Prior to installation of these forms, various attempts were made to keep production records, but each record

failed to give the information necessary to the economies that the use of these forms have made possible for my company.—*E. D. Burdick*, Assistant Treasurer, Kaukauna Machine Corporation, Kaukauna, Wis.

Quality-Quantity Bonus

In milling rubber, a combination quality-quantity control problem arose because whereas a shorter milling time increased production, it decreased quality. An incentive was decided on as a means of obtaining the right quality. But since quantity was important, too, and unusually high quality was needless, a quantity-quality incentive gave just the right control.

A sample of desired quality was given to the gang boss. If quality of the finished run was below the standard of the sample, no bonus was earned. No penalty was applied if quality exceeded standard, but inasmuch as top quality could only be achieved by longer milling time, production was cut down, with a consequent lowering of bonus earned.

*Selling the New Method

Installation of new and more efficient methods that call for increased production, without disrupting the good-will between management and employees, has always been a headache to all industrial concerns.

This is how we do it.

A classroom has been established which is conducted by an instructor trained specially for this type of work. Here the operators get their first introduction to the study of improved methods and the elimination of waste motions. This consists mainly of lectures and demonstrations of simple every-day operations performed by the operators themselves, using both the old and revised methods. In a comparatively short time, after learning to do the operations the revised way, at least 95 per cent of the operators are amazed to find that they can produce more work with less physical effort.

Automatically they become motion-minded, and it is a much easier and simpler task to teach them specific plant operations, which is the next step in their training. The average training period takes about three days, during which time the operators are paid their guaranteed hourly base rate.

Thus more efficient methods are used, production is increased, and the good-will of our employees is maintained.—*Thomas E. Fehringer*, Cost Estimator, Colonial Radio Corporation, Buffalo.

Cuts Tool Costs

A sloppy, crowded toolroom with attendant confusion and delay in issuing tools prompted one concern to install a new tool system which immediately began to show savings.

The tool crib was rearranged for greater convenience and more logical layout, and additional bin equipment was purchased. Tool activity control sheets now show how frequently tools

✦

When one firm established minimums for tool inventories, it was able to cut tool purchases $50,000 the first year.

TIN SHEETS CHECKED IN ONE-THIRD THE TIME

Each girl sorts 10 tons of metal sheets per day in one-third the time the task used to take, and more accurately. Direct-reading dial indicator gages make this improvement possible. Because the sheets are comparatively thin and thus have a tendency to buckle, the gages are provided with specially designed means of holding the sheets down on the lower anvil

are used, and inventory cards provide a perpetual inventory. Triplicate tool withdrawal slips—one for the man, one to charge the tool against the man, and one to indicate a charge against the tool—are made out for each tool issued. Broken-tool reports account for tools broken on the job and notify the production department what replacements are required.

Setting minimum quantities of tools to be carried has brought about reduction in tool inventory. Tools have been standardized so far as possible, and a tool budget has been worked out.

Benefits include a much lower tool inventory, fewer tool purchases, speedier issue of tools at the tool crib, and placing of responsibility for safe keeping of all tools.

*New Tabulating Card Saves $420 a Year

In tabulating orders, our production planning department has to catalog 600 items which, with variations in finish and size, give us 1,591 classifications. Since we manufacture eight brands, the possible classifications may come to well over 12,000. At the end of each manufacturing period, individual totals had to be drawn for each classification, then sub-totals and grand totals.

One clerk, using a comptometer and adding machine, spent 18 hours a week and an extra 8 hours at the end of each month in accumulating the month's statistical information, and in tabulating the totals on columnar forms.

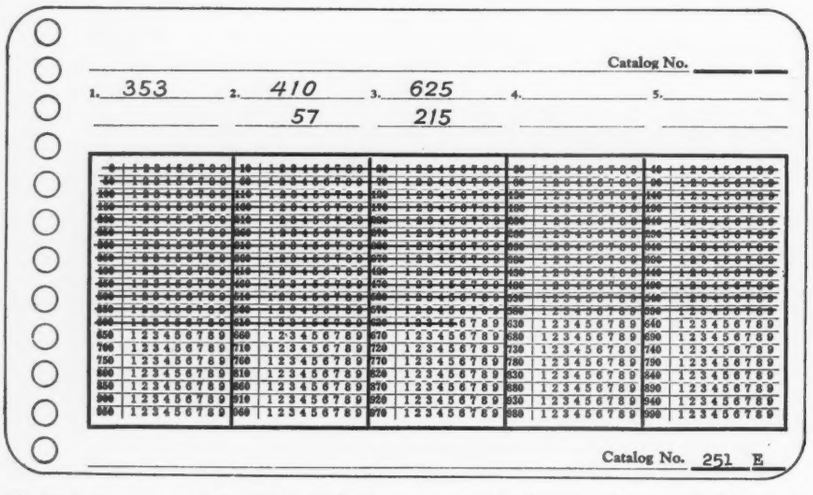
A tabulating machine seemed to be beyond our means, but it was apparent some simplification was necessary. Analysis showed that all the information required was being compiled; therefore, a faster method of tabulating the information was in order.

We drew our idea for the tabulating form we hit on from a cribbage board, a punch board, and an interest calculator. It contained simply a list of numbers from 0 to 999, with every tenth unit in bold-face type. Space for the part name and catalog number is designated in the top and bottom margins.

Now, for the actual work of tabulation, the clerk draws a pencil line through the numbers, indicating the total orders in the period. Taking the item designated No. 251E, for example, and supposing the first order is for 12 units, the clerk will draw a line from 0 to 10–2. If a few orders later he finds 17 more units of this item called for, he turns back to the No. 251E card and continues the line up through 20–9, showing that a total of 29 have been ordered to date in the period. As new orders come in they are automatically totaled by this method. And it is easy to see that it is faster to mark off numbers on this card than it is to write them down and then add them up. If orders climb up past 999 units, another card is added and its 0 is changed to 1,000.

The lines at the top of the card, above the numbers, designated 1, 2, 3, etc., are for weekly totals. The upper line carries the cumulative total, the lower the week's total. Thus, on the card shown, 353 units were ordered the first week in the month; 57 the second, giving a total of 410 at the end of the second week; 215, the third, giving a total of 625. In line 4 or 5 will appear the total for the month.

This installation cut clerical time on this job from 80 to 27 hours a month. This means a saving of $420 per year. —*Guy Dickey* and *C. P. Wagner*, Accounting Staff, Fisher Brass, Incorporated, Marysville, Ohio.



Clerical time was cut from 80 to 27 hours a month through the use of this card

✦

About to install a new tool control system, a manufacturer of heavy machinery ordered all tools turned in. What men long with the company had collected over the years was staggering.

✦

**Schedules Trucks and Saves $3,800

In two plants with which I am familiar, materials handling went any way but smoothly. Trucking costs were high, deliveries slow; production was seriously delayed, and the entire shop organization was firmly of the opinion that more truck equipment and truckmen were needed. In each case the least contemplated investment was $2,000, and the additional cost for labor was estimated at $1,800 per year.

Before making a decision, the manager requested a report showing daily deliveries to and from each department, and an analysis showed that the existing trucks were operating at only 50 per cent capacity. On most trips they were empty when going to departments, they lost time searching for and obtaining instructions from foremen who were not always available, and after delivery the return trips were usually made without load.

It was then decided to have freight terminals or "In-Out" stations in each department, and route trucks through these stations at regular intervals. Routes were selected that followed the normal flow of materials, and each route included only sufficient stations to insure the required frequency of movement. Occasional deliveries for stations outside the regular routes would be dropped at a central location and picked up by another truck whose route included the desired destination.

Each foreman was given the time schedule for his department and instructed to have material at the "Out" station, with a destination ticket, before the time of each truck arrival, and to expect material from other departments at the "In" station also according to schedule.

The effect of adopting this system was an immediate saving of several thousand dollars per year in productive

labor that had formerly been wasted by delays due to lack of material deliveries, $2,000 that would have been tied up in extra equipment, $1,800 per year in extra trucking labor, and fewer broken promises to customers.—*C. D. St. Clair,* Works Manager, American Machine & Metals, Inc., E. Moline, Ill.

Saves with One-Man Control of Inventory

Inadequate cost methods severely handicapped a Mid-Western manufacturer. Figures were not only late, but untrustworthy as well. Inventories had climbed too high, and records of materials used were undependable.

A one-writing perpetual inventory control was installed which, by supplying accurate inventory data, made calculation of standard yields possible. Triplicate time tickets for productive work and duplicate tickets for non-productive eliminated a great deal of posting, and provided production control without the necessity of posting a single item.

Now, 600 to 800 jobs per month, with an average of five operations per job, are costed, doubling the amount of information formerly provided without additional clerical help.

✦

Indirect expense in one plant went down 11 per cent the first six months a supervisory bonus was in effect. Most of the saving was in the reduction of scrap.

✦

Simplifies Cost Records

Finding defects in its own cost and payroll procedure, and wanting to adopt the punched-card type of record, but unable because of small volume to justify the use of automatic sorting machinery, one plant fashioned a system of its own along mechanical lines.

A time card showing operator's number, operation, number of pieces, and start and finish time, is made out for each job a man works on during the day. At the end of the day the timekeeper clips each man's cards together and forwards them to the cost clerk who calculates and enters on each card elapsed time, operator's day or piece rate, and the pay due the operator for his work on that job that day. Total day's pay for each man is entered on a payroll sheet.

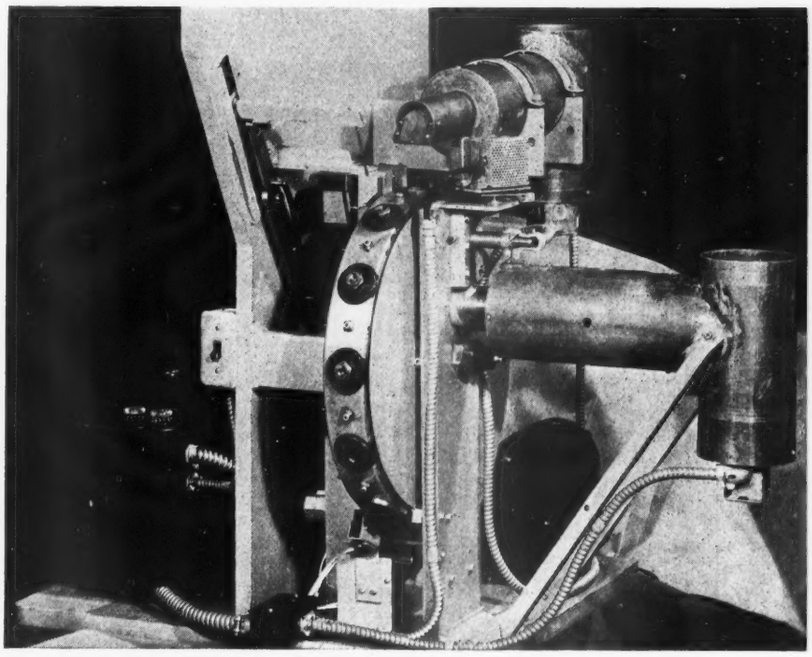
After the payroll figures have been obtained, the cards are sorted into two groups, representing productive and non-productive work. Non-productive cards are then sorted according to classification the accounting department wants, and totaled at the end of each month.

Direct labor cards, however, are filed by order number and are filed behind guide cards representing the orders in progress. When a production order has been completed, the guide card and all time cards behind it are withdrawn, and total cost is calculated. Cost analysis by operation, if desired, is a comparatively simple matter from that point, as is labor distribution. This method saves pasting to cost summary sheets.

Cuts Sorting Time 20%

A manufacturer of glass tubing was having trouble with breakage while sorting for inside diameter. The inside dimension was being measured with a taper plug gage. This method not only

Inspects a Bolt a Second



Photocell inspector turns a costly inspection into one that's fully automatic

Shackle bolts for automobiles must be inspected to make certain that the lubrication holes have been properly drilled and cleared. Usual inspection practice has been to blow air through these holes or attempt to see the light coming through the small orifice and at a right angle.

One manufacturer now uses a photoelectric device to make this inspection automatically. This inspector is arranged so that it will inspect one shackle bolt per second. The operator merely loads the bolts at the front of the machine, and an intermittent motion revolves the bolt in its holder up to the inspection station at the top. Here a small motor supplies power to revolve the chuck holding the bolt. This revolves the bolt, so that light coming from a light source above the machine passes through the small side hole of the bolt and impinges on a photoelectric cell mounted at the side.

If the photocell detects no light coming out of the small side hole, a solenoid moves a storing pin which is integral with the indexing drum. The pushing forward of this pin stores an impulse with this particular bolt, so that when the drum completes its revolution the bolt is dropped out at the bottom, in a pile of passable bolts.

If there is an obstruction in the bolt, preventing the photoelectric cell from detecting the light beam, the solenoid does not strike the pin, and as a result no impulse is stored. In this case the bolt is dropped out in a separate pile of pieces not passing inspection.

was slow, but also cracked about 10 per cent of the tubes. Incorrect readings were frequently made, since the fire polish was being measured instead of the inside diameter.

A special type of indicating gage, which shows the exact measurements on a dial, was provided with movable contacts that could be inserted in the tube. Sorting time was cut 20 per cent, the measurements proved to be accurate, and breakage decreased 10 per cent.

*Weeded Out Old Forms

During the last depression, we took stock of all our printed forms to see what could be accomplished toward lowering printing costs. We converted a vacant wall into a large bulletin board and began arranging forms on it, in the order they were used, beginning with employment requisitions and continuing down the line until we had the final form posted.

Our next step was to study the various forms and arrange them systematically. A large number were found to be out of date, and were immediately eliminated. Many were combined with others, and several were altered to serve two or more purposes. When this "weeding out" process had been completed, we had a condensed list of up-to-date printed forms.

The savings that this plan brought about are hard to estimate, as the idea had a far-reaching effect. The print shop was able to discharge all obsolete forms, as it now knew definitely what was current stock. A loose-leaf notebook was compiled of all current forms. Now, whenever a new form is wanted, this notebook is referred to, and if there is a similar form listed the two are combined, necessary alterations and changes are made, and the old forms are discarded.

When we began this plan the print shop had forms in stock dating back as far as 35 years. Now all they have are current forms, together with a permanent form record available for reference at all times.—*Charles E. O'Connor*, Works Auditor, Tractor Works, J. I. Case Company, Racine, Wis.

* CONTEST CUTS NUMBER OF ERRORS 60%

A special contest was conducted in our press department to reduce the number of errors made. This was conducted for a six-months' period. Teams of pressmen were made up, each having a coach and captain. For every week a pressman worked without an error he received a *gold* star. For every week in which he made an error, he received a *red* star. A large board was made up, with each pressman's name printed on it and 26 places for stars beside each name. Valuable merchandise prizes were given to each member of the three best teams. The winning team of eight men had only five red stars for the 6-month period, and all other teams showed a reduction of 60 per cent in number of errors.

We have been conducting this campaign less than one year and we feel that we have accomplished more than we did in all of our previous waste-reduction campaigns.—*Frank M. Voelkl*, Pressroom Superintendent, Standard Register Company, Dayton.

Non-Productive Labor Cut 12% in 3 Months

By measuring production operations in standard minutes of work, one firm calculates each operator's efficiency on the basis of the standard minutes of work done per hour. That efficiency is determined daily and weekly when pay is figured. Weekly efficiencies are posted to a quarterly summary sheet.

From the payroll cards departmental efficiencies and costs are figured weekly, and summaries of productive and non-productive excess costs in productive departments are prepared for the management. By relating the non-productive to productive costs, and the trend, the management is able to see where costs are getting out of line and apply pressure to reduce them.

In three months, while production doubled, non-productive labor ratios decreased from 49 to 43 per cent of the total labor cost.

Cuts Spoilage 70%

Because it was often necessary to deliver more material than needed to complete an assigned order in one department of an English plant, a surplus was frequently left at the machine. It soon became spoiled or was contaminated by mixture with other materials.

By the simple procedure of assigning a man to remove material as soon as it became surplus, material spoilage was cut from 1.86 to 0.60 per cent —in twelve weeks a saving of $3,678.

✦

Steel shelving now stores 22,000 different parts for a Middle West manufacturer in just half the space wooden shelves and bins used to occupy.

3 Veeder-Root ROUTES TO NEW SAVINGS AND PROFITS

1

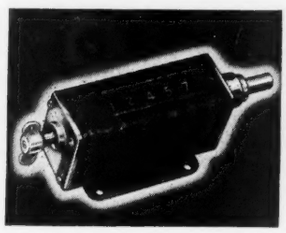
CONTROL OF PRODUCTION, SCHEDULING, MAINTENANCE, COSTS: Veeder-Root Counting & Computing Devices supply accurate "facts-in-figures" that show how and where to promote efficiency, anticipate maintenance needs, prevent waste. They will report on any machine or process, in any unit of performance or production. *Write for Catalog G-39.*

2

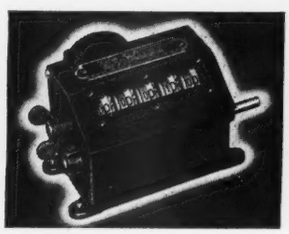
COMPUTATION OF WAGES AND ROYALTIES: Honest work-records, provided by Veeder-Root Devices, constitute a fair basis for wage payment, give office and plant workers a new incentive to turn out better work and more of it. Also, they are widely used to record the operation of machines sold on a "pay-as-you-use" basis. *Write for information.*

3

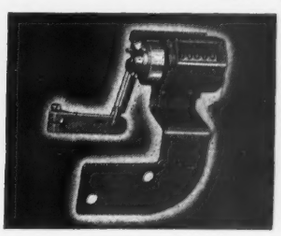
EXTENSION OF PRODUCT-UTILITY AND SALABILITY: Veeder-Root Devices have helped many products to do more, and so get more to do, *more sales fields to conquer.* Built into a product as an integral part, a Veeder-Root Device often adds to the product's value, sets it apart from competition, *gives it a new sales interest. Write for the Blue Book of Case Histories.*



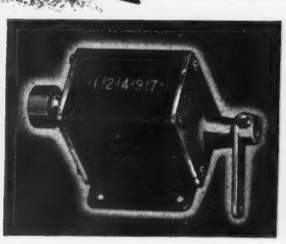
For High Speed Work. This High Speed Resetting Counter operates at 8,000 counts per minute in direct-drive type . . . 2,000 in revolution type.



Controls Machine Runs. This Predetermining Counter prevents over-runs and shortages on winders, fast automatics, etc., running at speeds up to 2500 R. P. M.



Accounting & Typing. This Production Computator records each keystroke on typewriters and accounting machines. Provides basis of wage-payment.



For Office and Light Production Machines. Small Reset Counters count strokes or revolutions. May be furnished with totalizing register.

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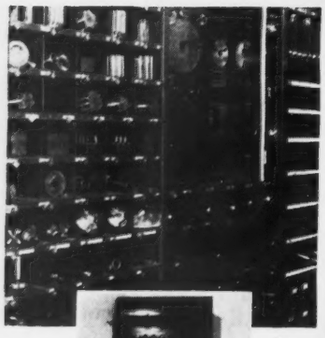
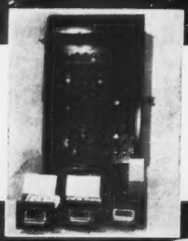
TO PUT YOUR TOOL ROOM *on the* *Profit Side of the* LEDGER





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SIMPLIFIES WHILE IT SYSTEMIZES TOOL ROOM REQUISITIONING

● With this system you will increase your productive time from two to four hours per man per month. You will have no hunting for misplaced tools; your inventory will be reduced because of promptness in returning tools; you will have a record of all broken, obsolete and worn-out tools; there will be no ganging-up or arguments at the dispensing windows. This complete control equipment will pay for itself in one or two months whether it is adapted to the larger plants, such as steel plants, chemical plants, machine shops, automobile factories, shipyards, railroads, construction jobs, etc., or to the smaller units such as colleges, vocational training schools, hospitals, garages and shops. It is a tried and approved system and can be utilized in your tool crib. With a cursory survey we can tell you in dollars and cents how much you can save over the method you now use by adoption of the Miller TOOLOAN System as YOUR System.

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Send us details as to how the **Miller TOOLOAN System** can be applied to our requirements.

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We have approximately.....men using tools.
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A Comparator, a Depth and a Small Hole Gauge are used for checking constant speed gears.

CUT Inspection Costs, while you Improve Quality

Dial Indicators are too frequently considered, only from the standpoint of checking dimensions of closely confined limits of one or two thousandths or even tenths of thousandths. Yet, their biggest value is in simply controlling production to the size specified. Valve bodies are not held to excessively fine limits,—yet, in one case, where approximately ¼ million inspections were necessary, six Federal Dial Indicator Gauges saved $8,000.00 simply because of their greater convenience and speed.

This is only one of many actual savings not only in time, as in this case, but in saved material and assembly troubles. Another type of Gauge saved 10% on breakage of glass tubes, at the same time saved 20% on sorting time, and allowed sorting into finer size divisions. Investigate the possibilities of Dial Indicators and Gauges from other angles than mere size control. Send for Catalog #39.

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PRECISION MEASURING INSTRUMENTS

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TIGHT CONTROL CUTS PRODUCTION COSTS

"The even flow of work in our various departments resulting from the use of McCaskey Production Control has lowered costs in numerous ways. We know at all times how much work each department is capable of absorbing without delays. Complete data for every order in process including material deliveries, work done in each department and the date of movement to each successive operation from beginning to shipment are available at a glance. No jobs need fall behind schedule dates because others are pushed ahead."

L. O. Koven & Bro., Inc., Jersey City, N. J.

"McCaskey Controls enable us to schedule machine operations and delivery of raw material intelligently and to follow up each operation on hundreds of production orders from a centralized control point. The exact status of any order may be determined in a moment without using production chasers. Cost data are almost immediately available. The system gives us a much tighter control of production and enables us to make reliable delivery promises and keep them."

Mason-Neilan Regulator Co., Boston, Mass.

TOOL COSTS $50,000 LESS

"After eight months operation with McCaskey Tool Control, data was available to set minimum quantities of tools to be carried. This resulted in a reduced inventory of most items. Gearing tools, for example, were cut from $4228 to $2239, drills were cut from $9000 to $7000, facing bars from $4080 to about $1500, chasers from $6000 to $3500, and end mills from $2800 to $1600. Purchases were cut down throughout the period, as we were using up tools to reach the minimum, resulting in a saving in excess of $50,000 for tools and supplies."

The Falk Corporation, Milwaukee, Wis.

"The disappearance of tools has been stopped entirely and arguments about tool responsibility long have been a thing of the past. Crib service is speedy and there is no loss of time looking for tools that have been loaned to employees. Varying conditions have been easily handled because of the flexibility of McCaskey Control."

Bausch and Lomb Optical Co., Rochester, N. Y.

IMMEDIATE COST DATA

"McCaskey Inventory and Cost methods have enabled us to 'cost' between six and eight hundred jobs per month with an average of five operations to a job, doubling the information formerly provided without additional clerical help. The data also is prompt and accurate, giving the management cost figures that are reflected in the profit and loss statement."

Caspers Tin Plate Co., Chicago, Ill.

INVENTORY AIDS PROFITABLE PURCHASING

"McCaskey Inventory Control, first installed in 1923, provides vital details at a moment's notice. With this information readily at hand, we can make our purchases most advantageously in the hundreds of widely scattered and highly volatile markets which represent our principal sources of supply. It also enables us to keep adequately supplied with those items which sometimes require from three to six months from the date of order until delivery. Our complete satisfaction with McCaskey methods is evidenced by the fact that we still are 'sold' after more than fifteen years."

Fritzsche Brothers, Inc., New York, N. Y.

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★ Hundreds of manufacturers, in plants large and small, are using McCaskey methods to tighten up their control of production. The lower costs that have resulted are reflected on the profit side. McCaskey Control may be the answer to some of the sources of irritation that are bothering you now. Let us give you more facts concerning their application to your individual requirements.

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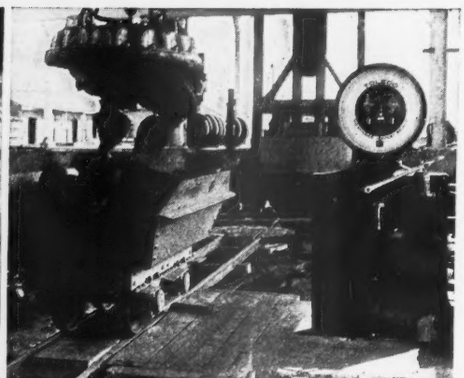
Use them. Tap the valuable information thus easily made available to you.

FOR PIE OR PIG IRON!



IN 45,000 WAYS

TOLEDO WEIGHT CONTROL GUARDS PROFITS

FOR manufacturers, mine operators, railroads, engineers, chemists, merchants, government offices, bakers and dairymen all over the world . . . our engineers have successfully applied the basic Toledo weighing principles to meet individual requirements.

Whatever *your* problem in weight control . . . our broad experience and years of engineering research are always at your call. 181 Sales and Service Offices throughout the U. S. and Canada.

NOW READY NEW 3rd EDITION

Send now for the *new* Edition of this most widely used single pictorial reference on modern industrial weighing . . no obligation. TOLEDO SCALE COMPANY, Industrial Scale Department, Toledo, Ohio.

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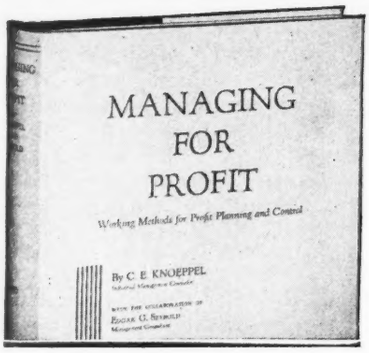
TOLEDO SCALES

NO SPRINGS HONEST WEIGHT



How to plan for and control *your profits*

What will it profit you to double your sales and have nothing left at the end of the year? What is the point—where is the line—in your business where you begin to make a profit? How can you determine that point and maintain it? These are the questions definitely, practically discussed in this book, just published.

MANAGING FOR PROFIT

By C. E. KNOEPPEL
Industrial Management Counsellor

343 pages, 6x9, 102 illustrations, $3.50

MR. KNOEPPEL, through years of professional experience, has found that unsuccessful managements are those which, as a rule, pay too much attention to selling or manufacturing *per se* and not enough to the economic fundamentals and financial considerations of business.. In this book he describes the recently developed aids to management in the way of profit-making tools and methods, shows how they work, explains how they can be applied to any business to better the profit position of the business.

Look up these special features:

—the accurate determination of fixed and variable parts of costs and capital;
—their combination to show probable results at different levels of sales or production activity;
—a definite and simple set of arithmetical formulas to aid in the profit-making work;
—the elevation of the controllership to a major place in the organization;
—a technique of variable budgeting to replace the fallacious fixed budgeting;
—methods for planning profits in advance.

See it 10 days on approval.

SEND THIS COUPON TODAY

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Send me Knoeppel's Managing for Profit for 10 days' examination on approval. In 10 days I will send $3.50 plus few cents postage, or return book postpaid. (Postage paid on orders accompanied by remittance.)

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Section 6 FACTORY'S Catalog Service

Production Planning and Control

FACTORY, through the cooperation of leading manufacturers, makes it possible for you to secure catalogs, bulletins, and booklets listed here without cost or obligation. Check and fill out the coupon below and send it to FACTORY. See other sections for additional catalog listings.

1 **Counting and Computing Devices**—General Catalog G-39 describes in detail a complete line of counting and computing devices . . . mechanically, electrically, and manually operated . . . for closer control of production, and greater utility and salability of a wide range of products into which they can be built. 40 photos of actual applications. Also Textile Catalog T-37, featuring the complete 2-3 Loom Pick Counter installation. **Veeder-Root Inc.**

2 **Dial Indicators and Gauges**—Catalog describes complete line of dial indicators and gauges for checking precision measurements and maintaining size control. Of interest to every one responsible for controlling machine parts and materials which must be held to definite dimensions. Describes equipment which features speed and accuracy of reading and adaptable to users' particular requirements. **Federal Products Corp.**

3 **"45,000 Ways to Weigh"**—A pictorial booklet with almost one hundred application pictures showing how modern weighing problems are solved in many kinds of industries. Contains valuable reference data showing how manufacturing costs, quality standards and profits can be better controlled by the use of modern weighing equipment. **Toledo Scale Co.**

4 **Optical Pyrometer**—A well-illustrated catalog, N-33-D, describing a new Optical Pyrometer, employing the potentiometer method. It shows how this instrument is used in the production of metals, ceramics, glass etc., as well as in the laboratory. A series of close-up photographs show at a glance how the instrument is operated. Also included is a discussion of the fundamentals of Optical Pyrometry so written as to be easily understood by the non-technical reader. **Leeds & Northrup Co.**

5 **Production, Inventory, and Tool Room Control System**—A series of four bulletins describing modern industrial control systems. Well illustrated. Describes production, inventory, maintenance, tools, costs and payroll control methods and equipment. **The McCaskey Register Co.**

6 **Service Recorder**—Booklet N tells how production machinery operation can be charted accurately to control idle time. Also booklet "Ten Ways of Getting More Work Out of Motor Trucks" describes use of the same type of recorder to chart productive time for motor trucks. Explains many money saving features of this type of equipment. **Service Recorder Co.**

7 **Temperature Controllers and Recording Thermometers**—Thermometer catalog No. 1251, on the subject of temperature controllers and recording thermometers for industrial process applications such as furnaces, ovens, dryers, and continuous processes as well as heating, ventilating, and air conditioning. This catalog contains timely and interesting engineering information concerning the control of temperature. **The Bristol Company.**

8 **Tool Control Systems**—A bulletin describing in detail the operation of the Miller Tooloan System for tool crib control, as well as all types of maintenance tools used by large and small plants, well illustrated and informative. **Miller-Tooloan Co.**

Use the coupon to

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Manufacturer's Literature

Section 6 MAILING COUPON—NOVEMBER 1939—Good Until February 28, 1940

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330 West 42nd Street
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MEASURED AIR BLASTS

SAVE YOU MONEY!

Letting air flow continuously when a regulated blast would do the job is needless and costly waste. Schrader Pilot Valves enable you to time the air used on presses and other machinery at any interval from a puff to a steady stream. They govern the air flow even after machine action has ceased.

Check your air system. You may find many places where Schrader Pilot Valves will substantially reduce your air overhead costs and increase production efficiency. Order through your own mill supply house.

Write for catalog No. 305 which includes the No. 9409 Pilot Valve, the complete line of Ejection Sets and other Schrader Industrial Products.

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PILOT VALVE

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Division of Scovill Manufacturing Company, Incorporated

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LYON TOOL STORAGE EQUIPMENT
For Efficient, Economical Tool Control

● Designed to save labor and floor space . . . to protect tools against pilferage, loss, damage and fire, Lyon Steel Tool Storage Equipment is built to last a lifetime. No matter how complex your tool storage problem, it can be solved with some economical combination of Lyon's complete line of adjustable units. Shelves and dividers are completely flexible . . . are easily rearranged to meet increasing or changing tool storage requirements.

LYON METAL PRODUCTS, INC.
1211 River Street, Aurora, Illinois

Lyon's new Tool Storage Catalog shows the most complete line of Toolroom Equipment ever built . . . makes it easy to solve any tool storage problem . . . suggests ways to effect major tool handling and storage savings. Write for FREE copy.

LYON STORAGE EQUIPMENT *Service*

"Our Machines Keep Busy"

YES, BUT *How* BUSY?

You'll never know *exactly* until you install the *Servis Recorder.*

It Tells When Each Machine Was Working or Idle—*and How Long!*

It shows up *all* delays—big or little. See how "time down" stands out on the chart below. You can't miss it. You can't help but reduce it! Suppose you could reduce idle time on all your factory machinery merely 10 minutes a day! What would it amount to in a year—or even a month! More than you will ever save by "little economies." The little "time clock for machinery," the *Servis Recorder,* bolts or clamps right on the machine itself—no ink, no pencils, no electric wires. Send for folder, "A Busy Plant."

THE SERVICE RECORDER CO.
1422 Euclid Avenue, Cleveland, O.

The Servis Recorder
The "Time Clock" for Machinery

Additional PRODUCTS–SPECIALTIES–SERVICES offering
"QUICK WAYS TO PROFIT"
"FACTORY" WHERE TO BUY SUPPLEMENT

COMPRESSED AIR DRYER
Costs Nothing to Operate
ELIMINATES OPERATING TROUBLES

Manufacturers and Engineers Sand Blast and Dust Collecting Equipment

The cause of many operating troubles in pneumatically operated equipment is moisture and oil in the compressed air supply. Cooling the air to a condensation temperature and expelling the oil and water by centrifugal action is the most scientific method known. Because the Ruemelin Compressed Air Dryer accomplishes this most thoroughly, it is being installed in ever increasing numbers in many leading industrial plants. Send for Bulletin 18-E.

RUEMELIN MFG. COMPANY
3897 N. PALMER ST., MILWAUKEE, WIS.

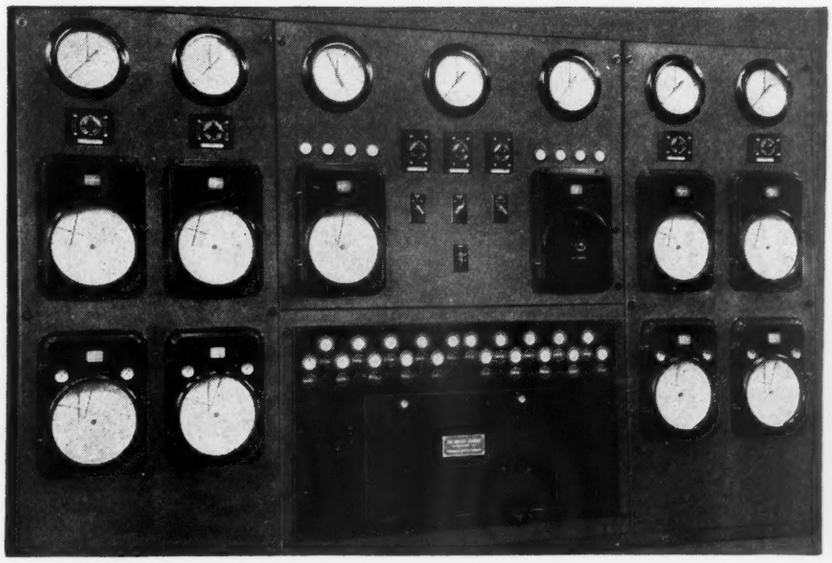
NOW, you can give your men what they need to consistently turn out A UNIFORM PRODUCT!

Another feature of
BRISTOL'S SYSTEM OF COORDINATED PROCESS CONTROL
that helps you end rejects, cut costs, improve quality

Think of giving your plant operators a "helping hand" that can take a *whole process* and carry out all phases of it *automatically*, from beginning to end, in accord with a production program that is known to give the desired results at the least cost! A helper that rigidly controls such variables as temperature or pressure, such factors as operation of valves or pumps,—in fact, that coordinates and interlocks all the vital events of the process so they take place on time, all the time, at the right values!

That, in brief, is what Bristol's System of Coordinated Process Control will do for you. An engineered combination of automatic control instruments and devices assembled in the form of a master control station, Coordinated Process Control facilitates production. It saves time, ends rejects, increases yield,—makes possible a greater profit otherwise unattainable.

Coordinated Process Control is the modern trend in process control. Now serving an impressive number of well-known, successful manufacturers, it offers you an opportunity you will want to know about. Write for Bulletin No. 460-511F.



In Wide Use Today This modern technique of Process Control is now being used by some of the most progressive and successful manufacturers in this country.

More Than Just Instruments

Bristol's System of Coordinated Process Control is made possible *only by the combination* of (a) the ability, experience and facilities of the Bristol's engineering staff to apply to a given plant problem a simplified layout of modern instruments providing complete coordinated process automaticity, (b) Bristol's Process Cycle Controller, the "mechanical brain" of coordinated process engineering, and (c) the complete line of Bristol's controlling, recording and indicating instruments for pressure, level, temperature, humidity, flow, motion, electrical quantities, etc., —a complete service backed by Bristol's undivided responsibility.

THE BRISTOL COMPANY
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Branch Offices: New York, Boston, Philadelphia, Pittsburgh, Birmingham, Akron, Detroit, Chicago, St. Louis, Los Angeles, San Francisco, Seattle. Canada: The Bristol Company of Canada, Limited, Toronto, Ontario. England: Bristol's Instrument Company, Limited, London, N.W.10

Bristol's System of COORDINATED PROCESS CONTROL

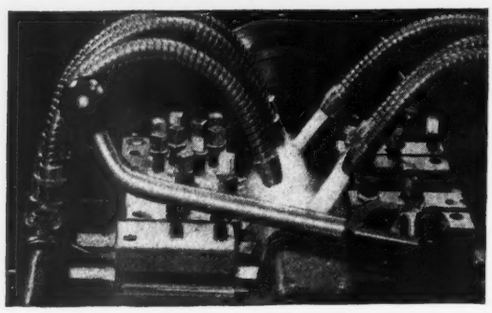
INDUSTRY'S GUIDE TO A UNIFORM PRODUCT

LET'S GET THE FACTS . . . ★

In the last few months, over 1000 engineers and production executives of leading industrial concerns here and abroad have found it well worth their while to investigate the good qualities of Flexible METAL Hose and Tubing. Here indeed is one of industry's most useful products... strong, safe, versatile . . . a final answer to hundreds of tough engineering problems.

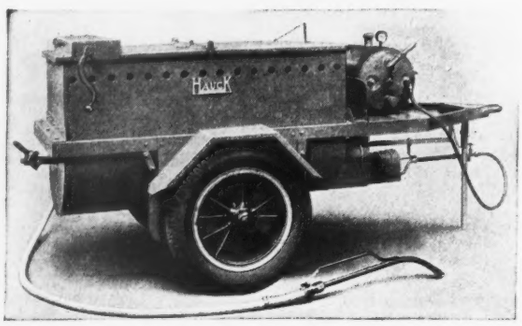
Get the facts...sign the coupon to receive your copy of the "FACT BOOK" of Flexible Metal Hose and Tubing.

have you thought of Metal HOSE or TUBING for jobs like these ?



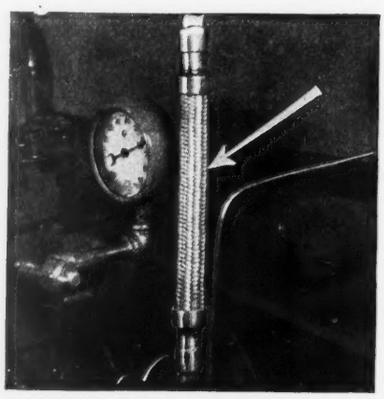
CUTTING-OIL GUSHERS . . .

Not only are these Flexible METAL Cutting Oil feed lines more convenient because they stay put exactly where directed by the operator, but they look better and wear longer than old-time jointed pipe or hose connections.



HANDLING HOT ASPHALT . . .

that's a tough job for hose . . . in fact an impossible job for many types of hose... but thousands of feet of Flexible METAL Hose have been doing it for years without trouble.



VIBRATION VANISHES . . .

when short Flexible METAL Hose connections like this are placed in compressor lines on refrigerating equipment. It licked one of *that* industry's toughest engineering problems. Perhaps the same principle can do as much for you.

Flexible METAL HOSE AND TUBING INSTITUTE

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Production Methods and Materials

in the cost-reducing program

IN THOSE PRODUCTION METHODS that are common to much of industry, opportunities for savings are legion.

Perhaps a change in packaging—or in packing.

Altered assembly sequence.

Adoption of a new assembly tool.

Use of instruments for process or operation control.

Introduction of a process such as welding.

Substitution of equipment for hand method, as in finishing.

Or changing a practice, such as moving tools to work instead of work to tools.

These are but suggestions of the things that can be done in cutting production costs as a primary step toward profits.

Cement manufacturer hard-faces clam shell bucket lips, increases their life ten times . . . automotive plant passes light lubricating oil through a carbon filter, saves half the cost . . . bag maker saves $1,500 a year with new high-temperature refractory aggregate . . . paper mill gets $1,150 return on a $75 investment in a special-alloy pump . . . these are actual savings made in actual plants by plant operating men who keep abreast of new developments and take full advantage of the newest and best in materials. In every case the savings meant lower cost of operation, lower prices, more sales, more jobs, and just that much more profit.

WHAT TO DO

SUGGESTIONS THAT POINT THE WAY

Consider advisability of changing to other forms or sources of heat, in all manufacturing operations that involve its use.

Investigate the possibility and advantages of wider use of indicating and recording instruments of all types, for closer control of production operations.

Investigate advantages of automatic control of temperature, pressure, and other factors, to maintain more uniform conditions.

Study advisability of substituting die castings, welded construction, or stampings for other, more expensive constructions.

Study possibility of replacing present materials with cheaper, but satisfactory, grades of the same materials, or with other kinds.

Study possibility and advantages of using welding in place of other methods of joining parts.

Check up methods of reclaiming used materials and defective parts to determine possibility of reducing costs or increasing effectiveness.

Investigate possibility of saving time and labor by using portable power-driven tools on various operations now done by hand or in other, less convenient ways.

Phone . . . Wire . . . or Write For Quick Stock Shipment

When a man's in a hurry for steel, he gets quick action at Ryerson. He gets steel that has uniform machining and fabricating qualities, so that no time will be lost in the shop. He gets this steel at no additional cost.

Ryerson Certified Steels include all kinds—from Open Hearth Carbon Bars to highly polished Stainless—Shafting to Structurals—each having the qualities most desirable in the particular type of steel. More than 10,000 sizes and kinds are in stock for Immediate Shipment. Special order and dispatch systems—experienced steel men with modern equipment and every shipping facility are your assurance against delay.

When you need steel of any kind, phone, wire or write the nearest Ryerson Steel-Service plant and get prompt shipment of uniform high quality steel certified by Ryerson.

Joseph T. Ryerson & Son, Inc. Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo,. Boston, Philadelphia, Jersey City.

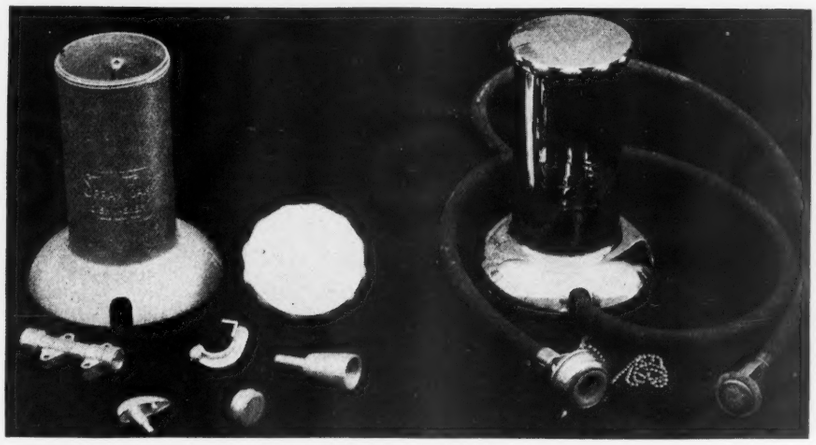
Ryerson Products Include:

Stainless Steel
Cold Finished Shafting
Strip Steel, Flat Wire
Alloy and Tool Steels
Heat Treated Alloy Bars
Beams, Structurals
Channels, Angles, Tees, Zees
Hot Rolled Bars
Bands and Hoops
Plates (over 15 kinds)
Sheets (over 25 kinds)
Mechanical Tubing
Boiler Tubes and Fittings
Welding Rod
Rivets, Bolts, Nuts, Washers
Concrete Reinforcing

Write for Stock List

RYERSON STEEL-SERVICE

Die Castings Save 48%



Eleven zinc die castings for dishwasher save 48 per cent in production costs

Sprayfoam Dishwasher Company, Santa Monica, Calif., is marketing a machine composed of eleven zinc die castings. The largest is a cylindrical container for the assembled mechanism measuring 8 inches in height by 5½ inches in diameter.

This housing is cast in one piece, and the die contains three cores, one of which is pulled out after each shot in the casting machine. At the top of the housing, external threads are cast so accurately that no chasing is necessary to give a good fit to the female threads which are also cast into the cover.

Originally some of the parts were not die cast. Other slight changes allowed complete assemblies to be cast in the same die. Final result is a saving of 48 per cent over any other means of production.

Twice the Output from New Ovens

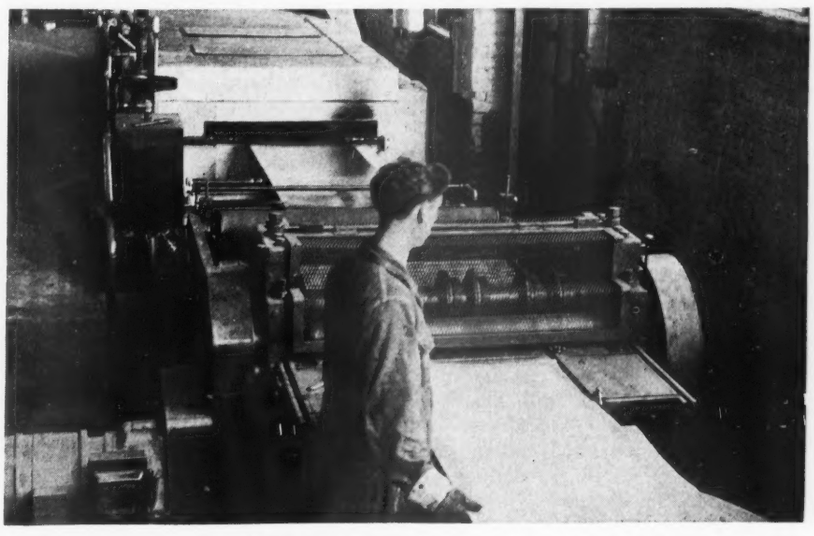
Cutting of sheet metal for laminations and application and baking of varnish are made one continuous process with the aid of a conveyor system and "flash-baker" oven recently installed by the Reliance Electric & Engineering Company, Cleveland.

Flash-baking is so called because the varnish is deliberately set on fire by a row of gas burners as the sheets enter the oven. This firing quickly removes the volatile thinner and speeds up the baking that immediately follows.

After baking, the laminations pass through a cooling chamber and out of the oven. The full process takes only a little more than two minutes, and although the steel sheets have been subjected to 750 degrees Fahrenheit for about half a minute, they emerge sufficiently cool to be handled with gloves.

Several protective devices operate to control air, gas, and power supplies to the oven and are so interlocked that the failure of any one of the three, or of the ventilating system, will immediately lock out the others and stop the oven and conveyor mechanisms.

Operation of the new oven in conjunction with the slitter and varnish coater has resulted in a substantial increase in efficiency. Quality of the finished laminations has been improved by the increased ability to give the sheets a highly uniform baked finish. By reducing the baking time the flashing process has made it possible to move steel through the oven at approximately 25 feet a minute, more than doubling the output formerly obtained.



Conveyor system and "flash-baker" oven more than double former output

*Save $500 a Year on Cooling Water

We use a large number of steel roller mills and ball mills in grinding our enamel products. These mills require water cooling to avoid excessive heating of the product during the grinding process.

For many years the water used in cooling these mills was piped from the city mains, and after performing its cooling function was run into the sewer. A few years ago we checked our consumption of city water and found that 50 per cent of the water we were paying for was used for cooling purposes only.

As a result of this check up we installed a water-circulating system. A 1,000-gal. tank was placed on the floor above the grinding department, with a similar tank in the basement. These tanks were connected to the grinding equipment with the necessary piping, and a pump was installed at the basement tank. The water is collected in the basement tank and pumped to a small spray pond on the roof. From this point it flows into the tank on the top floor, thence through the pipe lines to the grinding equipment where it performs its cooling function, and then runs through discharge pipe lines to the basement tank. Additional quantities of water are run in as required to

offset evaporation losses. The water temperature is raised only four or five degrees during the cooling function, so that a simple spray pond was sufficient to offset this temperature increase.

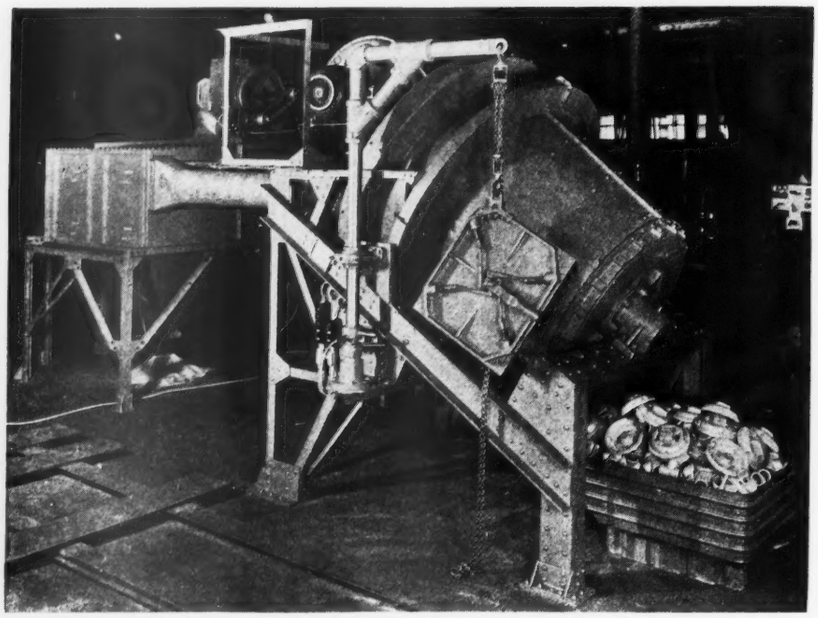
This circulating system is used constantly, except for the warm summer months. Since its installation the annual savings in our water bill have averaged nearly $500 per year. These savings have been sufficient to pay for the cost of installation in 3½ years, are now showing a handsome return on the investment.—*R. C. Stark*, Pratt & Lambert, Inc., Buffalo.

CUTS PACKING COST 23%

After experimenting with various methods of sealing the paper bags in which his product is sent to the market, a coffee roaster found that the use of wire staples made a saving of 23 per cent in packing cost, and 18 per cent in packing time. There was, in addition, a sizable saving in the cost of bags, because one of less expensive construction can be used. The staples are driven in by a device which is operated by an electromagnet controlled by a touch switch

*Change to Aluminum Avoids Need to Plate

One simple method of cutting costs that we have adopted is fabrication of our products from aluminum to avoid the necessity of plating them. We have followed out this idea with gratifying results on a number of products, such as pans, reflectors, and tubing. Not only has the expense of plating been eliminated, but we have also reduced production time.—*J. Lyon*, Lyon Rural Electric Company, San Diego, Calif.



Two blast mills do the work of eleven tumbling mills, reduce cleaning costs

Blast Mill Cuts Cost of Treating Castings

Failure of tumbling mills to give satisfactory results led the Muskegon Piston Ring Company, Sparta., Mich.. to seek means of reducing the cost of cleaning piston ring castings. Investigation of the problem eventually resulted in replacement of eleven tumbling mills with two blast mills which are built on the principle of a direct-connected motor blower, thereby eliminating the use of compressed air.

By reason of the greater efficiency the blast mills produced better results than had previously been obtained, while the reduction in the number of cleaning units from eleven to two has resulted in important savings in labor, floor space. power, and maintenance costs. A further saving came about through eliminating the use of compressed air, thereby cutting out the cost of operating and maintaining compressors and their associated piping and equipment.

Obviously, the savings will soon repay first cost of this equipment.

All-Metal Gages Stop Thermometer Breakage

A manufacturer of sterilizing and drying units which require temperature indicators recently adopted the use of all-metal temperature gages in place of ordinary thermometers. Although this change was made primarily to provide an easily readable, dial-type scale for customer convenience, it was found that an appreciable saving resulted through the reduction in the breakage of thermometers during assembly, handling, and shipping of the equipment.

The reduction in the number of such mishaps is especially noticeable in assembly. where several operations must be performed after the thermometers have been mounted.

**Specifying Weld Size Lowered Welding Time

On structural steel work on which stresses are great, it is customary to show on blueprints the number of welds required, and specify their thickness and length. On ornamental and miscellaneous light fabricated steel, it is customary not to show or specify the size of welds. I discovered that on picket balustrades we were fabricating, welds were fourteen times as strong as they need be. The reason for this was that the men in the shop had no knowledge of stresses in joints or strength of welds. Consequently the tendency was to make the joints plenty strong.

I asked the draftsmen why they did not show the size of welds on light construction. They were unanimous in saying that it would take longer to calculate the stresses and to show the size of welds on the drawings than the time that could be saved in the shop if the

correct sizes were shown. Since my observations on the railing did not bear this out, we made a large number of check calculations and found that it took from 2 to 15 minutes to calculate and show the size of welds on drawings, and the saving in welding time was all the way from 30 minutes to several hundred hours.

On the average, it is safe to say that on this type of work a saving of over 10 man-hours will be made in the shop for every man-hour spent in calculating and showing the size of welds.—*James Winston*, Production Manager, Valley Engineering Company, San Bernardino, Calif.

Filter Doubles Tool Life

A manufacturer of electrical signal equipment makes rings on an automatic screw machine at the rate of two and one-fourth pieces per minute. Three operations are involved: Boring and forming from round bar stock; recess-machining five saw teeth inside the ring; cutoff. Only one forming and cutoff tool is used, while two boring and recessing tools are employed. The forming tool, therefore, does double the work of the boring and recessing tools, and any increase in the time that elapses between grindings of this tool is sure to produce worth-while dollar-and-cents savings.

A multiple-disc, edge-type self-cleaning filter was placed in the line to handle the full flow of 4½ gallons per minute of compounded cutting oil. Prior to installing the filter a forming tool had to be ground every three to four days. Since installing the filter, tool life is six to eight days. These results were checked by operation of two machines, one with and one without a filter.

Removal of fine chips by the filter, and consequent elimination of their abrasive action has doubled the time between grindings.

$45 Clamp Saves $370

An Iowa manufacturer of construction machinery saved $4.61 each on the fabrication of fourteen crane booms, or a total saving over former methods of $64.54 in one year through the use of a handy shop device, one of whose many functions is clamping or holding for welding, bolting, or riveting.

Versatile clamp, which cost $45, pays its way in this shop many times over

Between boom assembly jobs and when not otherwise in use on production work, this equipment was used a number of times during the year to pull spoked, webbed, and plate center wheels. gears, pinions and pulleys on construction equipment in the shop for repair or rebuilding; on new equipment being built, and on machinery used for production. As closely as could be determined, the net savings through time saved totaled $57 for the ensuing year.

Because of the versatility of this equipment, it was used in many phases of production work, and on maintenance as well. Because of the overlap in demands for the device, a number have been ordered for exclusive use in maintenance work.

Records show larger savings in production work. On spreading, pulling-in, clamping, and crawler-tread mounting and alignment, it is estimated that savings in manhours approximated $294. On various occasions this tool was used as a jack and to support partly assembled equipment so the shop crane could be released for other work.

On the work that the tool crib foreman was able to keep track of, use of the device effected net savings of $415. according to time studies.

Since this equipment cost the user less than $45, there was a net annual saving of more than $370.

How remove weld beads from hard-to-get-at places in food pans? A manufacturer of utensils faced this problem, solved it by using flexible-shaft grinders, suspended overhead.

✦

Just as Good Steel for 5½c Less

There are a considerable number of iron alloys commonly known as stainless steels because of their ability to resist rusting, tarnishing, and chemical attack. These steels vary in their composition, properties, machineability, and cost. Ignorance of the properties of these alloys frequently leads to the tendency to select a type of stainless steel that is more resistant to corrosion and more expensive than the requirements dictate.

For example, a bicycle manufacturer formerly made wheel rims from the well-known 18–8 stainless steel. This steel was perfectly satisfactory, but it was later discovered that a 17 per cent chromium iron is sufficiently rustproof for the purpose, can be fabricated satisfactorily, and is 5½¢ a pound cheaper than the 18–8 steel.

**Scrap Reduction Plan Has Saved $116,000

First step in the operation of this scrap control plan is to have inspectors fill out a daily scrap ticket for each lot of spoiled work. These tickets embody the following information: Catalog number, number of pieces scrapped, type of material, reason for scrapping, condition of last operation, department in which scrap was produced, department charged for scrap produced, date, machine operator's number, department foreman's signature, department inspector's signature, material and labor cost per hundred pieces, total scrap cost (total material and labor).

The tickets are then sent to the cost department to be priced with material and labor costs. The next step is that of recapitulating the accumulated scrap tickets by departments semi-monthly. This recap includes not only the departmental cost by half months, but also the departmental cost of scrap for the fiscal year to date.

Going still further, these figures are divided by the number of finished units produced during the period. From this scrap cost "per unit of manufacture,"

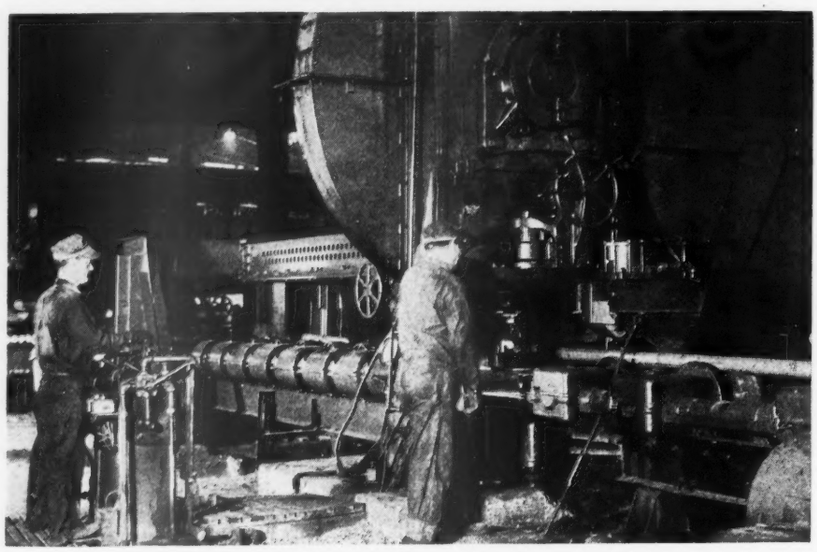
the foremen can readily observe the trend of their scrap cost.

Another plan tried to spur on scrap reduction was that of compiling reports for the foremen, showing by periods what percentage of the total scrap for the company was charged to each department. The departments with the highest scrap percentage were listed at the top. The results were encouraging. The foremen with the largest percentage of scrap strove hard to reduce their scrap and thus work their way down the list, while those who were near the bottom put forth their best effort to retain their position.

The opportunity of looking over scrap tickets after they are priced and recapitulated gives each foreman a clear conception of the cause of his department's scrap. He analyzes his spoiled work and determines whether improper jigs and fixtures, poor tools, low time-study rates, or carelessness are responsible for unnecessary scrap, before he undertakes to remedy the situation. He may choose to draw up a list of men who are the worst offenders, designating them by their clock numbers and posting the clock numbers, together with the cost of scrap for the period, on bulletin boards. This method has been found to secure results in a hurry.

The above scrap reduction methods have resulted in a savings of about $116,000 in spoiled work over a period of six years.—*Charles E. O'Connor*, Works Auditor, Tractor Works, J. I. Case Company, Racine.

BILLET SHEAR CUTS COST OF TUBING



In a seamless tube mill, round bar stock for the manufacture of tubing formerly was cut to length by sawing. This process was considered necessary because a good end cut is essential for the piercing process. The material is quite hard and tough. A heavy billet shear was installed that produces good, square end cuts complying with the requirements of the piercing operation. At the same time it reduced considerably the cost of cutting the bars, and has made possible a greater number of cuts per hour

*Ejector Saves 40%

Operating cost of forming certain parts on presses was reduced 40 per cent while the operation was made safer by introduction of a specially designed ejector.

Under the old method a helper had to be stationed at the rear of the press to pry the part loose after it had been formed. Sometimes the part would stick in the die, and the press would have to be stopped.

An automatic ejector was devised and installed that removed the need for the helper, allowed the press to be operated continuously without delays, and decreased hazards on the operation by eliminating the cause for placing hands in the die.

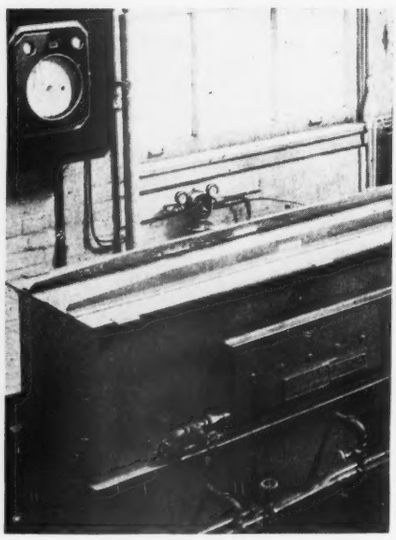
This ejector loosens and brings the part up out of the die, throws it toward the operator, clear of the press. As the press descends, the ejector arms are deflected by the piece being formed, compression springs push the ejectors under the part, and on the machine's upstroke the part is pulled completely free of the die.—*R. A. Shaw*, Director of Safety, The Murray Corporation of America, Detroit.

Control Pays in 4 Weeks

Solvent consumption by the degreaser in the plating room at Taylor Instrument Companies, Rochester, N. Y., has dropped from 10 to 2 gallons a day. And solvent isn't cheap. It costs about $1.50 a gallon.

Credit the saving to a recording temperature controller which, when installed, revealed wide variations in temperature. The operator was taught the importance of maintaining a constant, effective temperature, and warned about admitting and removing the work slowly so as not to disturb the vapors and make them overflow, wasting valuable solvent.

Cost of the degreaser control was about $250. From the savings in solvent, the instrument paid for itself the first month. There is also a labor saving; the operator no longer has to watch the machine constantly and operate a hand valve. He is left free to do other work.



Temperature control on a degreaser is saving 8 gallons of solvent per week

**Machine Conversion Ups Production 20%

For a number of years the short-sectioned full-fashioned hosiery knitting machine has been dangerously close to obsolescence due to the lower operating cost of the highly competitive longer and faster machines.

Many mills had been scrapping the

short machines, but the large manufacturers were confronted with a serious problem in replacing large quantities of equipment that could still produce a marketable product, but at an excessively high cost.

During the past year, I developed a plan to convert these short machines into longer and faster units. This was accomplished by splitting an 18-section machine into 3 units of 6 sections each, and adding, by insertion, 6 sections to the approximate center of another 18-section machine, thereby creating a 24-section machine.

By the addition of shock absorbers, balancing cam units, reinforced cam shaft shifters, and other improvements, the speed was brought up from 56 courses per minute to 64 courses per minute, thereby creating an additional labor saving over and above that obtained by creating the longer machine.

Production was increased by 20 per cent and direct labor cost was reduced by 15 per cent, thereby bringing a return on the investment for rebuilding within one year.—*B. R. Eckstein,* Factory Manager, Gotham Silk Hosiery Company, Inc., Philadelphia.

Wet Grinding Cuts Costs 29%

Installation of a machine designed for wet grinding eliminated these troubles. The water not only carries off the heat developed, thus preventing distortion, but it also washes the waste material off the grinding belt, preventing clogging and thus speeding up the operation. Another important advantage is that the fine grindings are washed down into a container, thereby eliminating dust and explosion hazards.

Speeding up the grinding operation made it possible to reduce the piecework rate from 7¢ to 5¢ per pair, a reduction of nearly 29 per cent. Another saving came about through the 66 per cent saving in the amount of abrasive paper used. An abrasive paper belt is good for more than a week of constant service, producing 500 pairs of leg forms per day.

In addition to these other advantages, a more beautiful finish is obtained than was formerly possible.

Finishing of leg forms for displaying stockings and shoes presented a problem which one manufacturer eventually solved at a considerable saving over the methods previously used.

These forms are made from sheet celluloid which is molded and shaped in heated steel dies. In the finishing operation all die marks must be removed and the surface made as smooth as possible in order to prevent tearing of sheer stockings. Hand-finishing was first employed, but was expensive, although it produced a good finish.

Dry machine grinding was tried in an effort to reduce the cost of the finishing operations, but was not successful. There was no apparent increase in production over hand-finishing, and the finish obtained was inferior. One of the troubles encountered was that the heat generated during the dry grinding operation distorted the celluloid.

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Money spent for cleaning compound used to total $750 per month. Installation of a wash tank reduced this to $35.

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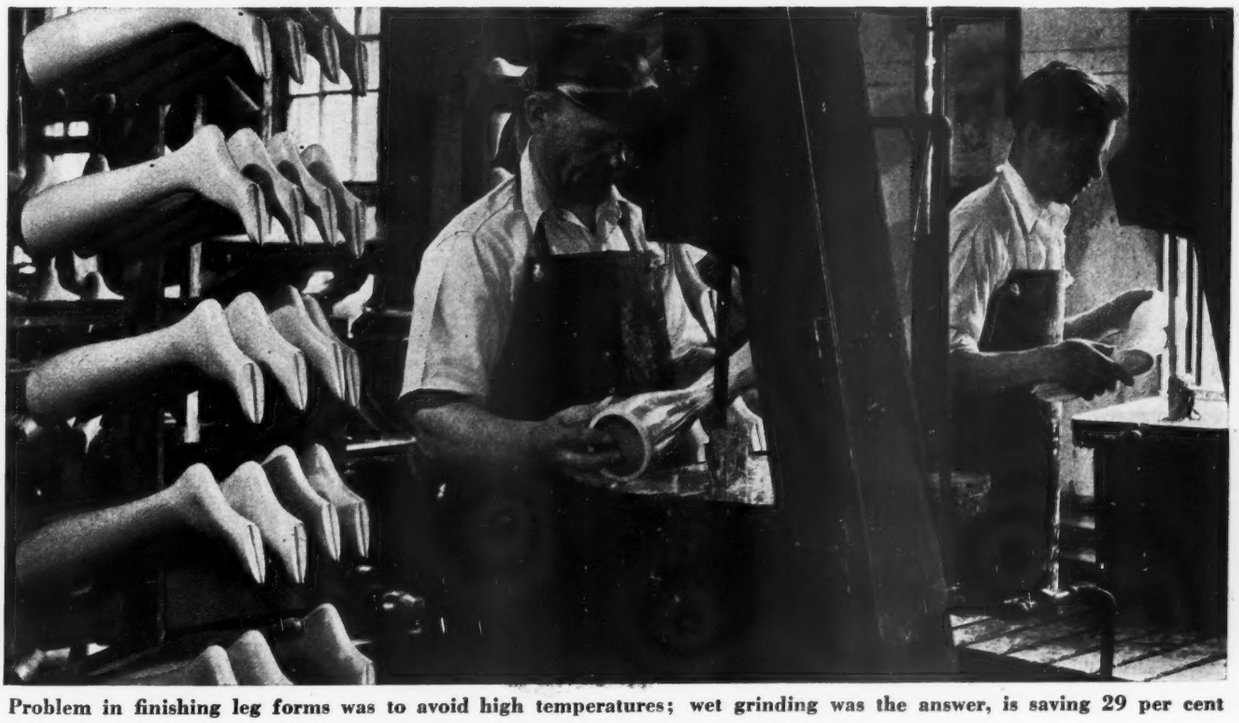
Washer Pays for Itself in a Year

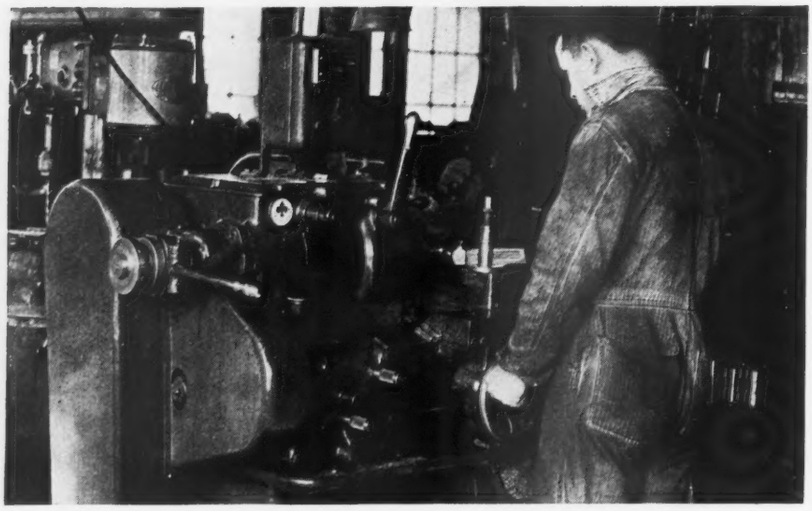
A nut and bolt manufacturer in Cleveland has installed a continuous wash, rustproof, and dry machine. Washing used to take the entire time of two men. Now one man with the new machine spends only part of his day on the job. The savings in labor was enough to return first cost the first year.

The machine is equipped with a belt conveyor that brings the work back to the charging end. All the operator has



Problem in finishing leg forms was to avoid high temperatures; wet grinding was the answer, is saving 29 per cent

NEW LATHE UPS PRODUCTION 50%



Replacing an obsolete lathe with a modern machine has brought about an increase in production on a particular job from 40 to 60 pieces per hour—in other words, 50 per cent. That is the experience of one manufacturer

Carbide Cutters Step Up Output 77%

Use of cemented carbide cutters enabled a manufacturer of light machinery to save a little more than $40 every eight hours on one operation. This operation involves face milling the top of a cast-iron sewing machine bed with an 8½-inch diameter mill.

With the cutting alloy tools previously used, the rate of feed was 5½ inches per minute. The number of pieces produced per grind was 225, and machine output was nine pieces per hour. Upon adoption of the cemented carbide tools the speed was increased to 7 inches per minute and the number of pieces per grind to 700. The combined effect of these increases was to step production up to 16 pieces per hour, or an increase of 77 per cent.

At this rate, the new mill paid for itself in 33 hours of operation.

to do is charge the work into the machine and put the tote pan underneath the end of the conveyor. This saves unnecessary walking.

Batches stay separate. No danger of mixing. It is only necessary in loading to wait a few seconds between batches.

Resists Sulphur Dioxide

Trouble was formerly experienced by an eastern chemical plant in preventing leakage at the joints of pipe and equipment handling sulphur dioxide gas.

Flanged joints made up with a double ring of asbestos rope saturated with a special sealing compound have now stood up for many months without leakage, whereas all materials previously used failed within a short time.

Plastics Save Finish Cost

When designing a good-sized wheel-shaped part which is an important element in a new business machine, it was first considered that steel would be the most suitable material. After considerable work had been done in designing the dies, it was found to be impracticable to form a complete half-section of the wheel. Even forming a half-section in three pieces was seen to be a difficult task, aside from the additional work of joining the parts and finishing the complete assembly.

Die casting came in for attention as an alternative, but the high cost of the dies and of an alloy that would be sufficiently strong and durable caused eventual rejection of this method.

Solution of the problem was found in the use of a molded plastic. Cost of the mold for forming the plastic part was about the same as for stamping and casting dies. Use of a plastic material, nevertheless, eliminated the difficult machining operations, as well as the welding and finishing, that would have been required with steel parts. After forming, the molded plastic parts require no additional treatment.

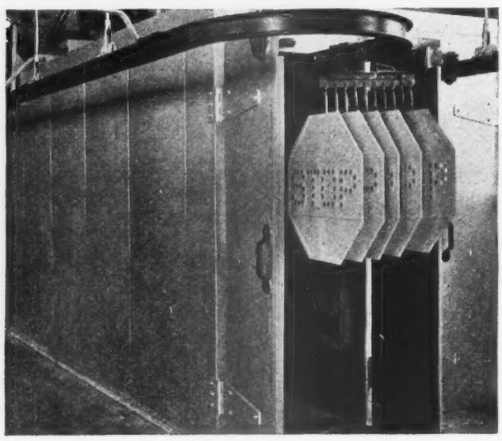
*Standardized Controls for Flexible Operation

A change in the method of processing necessitated the rebuilding of some of our machines. After the changes had been completed, a great deal of thought was given to the location of the machine controls—valves, switches, etc.—with a view to accessibility, convenience, and cutting down the movements the operator was obliged to make. Indicating instruments and gages were conveniently placed in locations that made observations easy.

Machines of the same type were arranged in duplicate in every respect. This stepped up the efficiency of the department as a whole, for operators can now be transferred from one machine to another and be perfectly familiar with the controls. It is not necessary, therefore, to maintain a set of operators for each machine, and

QUICKER DRYING, LESS SPACE, BETTER SIGNS

Stop-and-go production doesn't go for stop signs, The National Colortype Company of Bellevue, Ky., has discovered. Increases in the demand for this product meant that the company had to turn out more signs in the same production space. A continuous oven reduced the amount of room required for drying operations, shaved drying time, cut handling costs to the veriest minimum, thus produces a better traffic sign for less money



while one machine is being prepared for a run, the operator can be operating another machine.

Labor cost was reduced and a much improved operating schedule was maintained. Production increased approximately 20 per cent, while the unit cost of production was reduced 15 per cent. —*W. T. Estlick*, Plant Engineer, The Ansonia O. & C. Company, Ansonia, Conn. (Two $5 prizes.)

New Screws Up Output and Earnings

Adoption of recessed screws made it possible for a furniture manufacturer to increase wages of employees and thus improve relations with the men, while increasing profits. It all came about because the men found they could drive the recessed-head screws faster than the ordinary type. Therefore they turned out more work, and, since there was no change in the piecework rate, their earnings were proportionately increased.

Management, on the other hand, is well satisfied with the increased production and the resulting savings.

Saves $28 Per Day with Spray Finishing Units

A manufacturer of watches and clocks installed an automatic unit capable of lacquering and drying 13,400 clock bases per 8-hour day, with 1½ minutes oven drying at 180 degrees Fahrenheit.

Formerly 1,000 bases could be sprayed by hand in 2½ hours, whereas the same number can be coated and dried automatically in 37 minutes, or one-fourth of the time required by the other method. It is estimated that material and labor savings equal $21 per 10,000 pieces. On a daily production of 13,400 pieces per 8-hour day, the savings in labor and material amount to $28.14 per day.

Cost of the unit was approximately $2,000; therefore it was paid for in 71 working days. In addition, better and more uniform finishes are assured.

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When an Eastern concern replaced an old lathe, it found hourly production on a plastic and stainless steel molding was jumped from 20 to 45 pieces.

Resinoid Snagging Wheels Save 50%

Grinding wheel consumers measure expense in terms of cost per ton of material removed. One concern felt that it wasn't getting its money's worth, calculated wheel cost per ton of material removed, and found it to be $4.39. A manufacturer's engineer was called in and a wheel was given a trial which was believed to have the grain and grade combination and type of resinoid bonding material best suited for the material being ground. Extensive tests showed that the new wheel removed stock at a cost of $2.05 for each ton removed, a saving of over 50 per cent.

With old grinding wheels, cost of removing material was $4.39 a ton; with new wheels it is running $2.05

Machining Time Down 75% with New Lathes

Many of the parts that go into power-operated shovels are large, odd-shaped, difficult to hold. Machining costs tend to be increased by the fact that the great majority of these parts are put through the works in small lots.

Time required to turn a heavy bronze bushing, for example, formerly was 29 minutes. These bushings are made up in lots of 50. Tolerances are plus or minus 0.0025 inch. When the job was put on a new high-speed, heavy-duty turret lathe it was found that turning time was reduced to 7.22 minutes, a saving of 75 per cent.

Another part on which a big saving in machining time was effected is a large cast-iron ring. It is a heavy-duty chucking job on which the tolerances are plus or minus 0.003 inch. Transference of this job to a new turret lathe was followed by a drop in machining time to 74 minutes. This represents a saving of 50.8 per cent.

Welding Timer Reduces Rejects to ½ of 1%

A manufacturer of diesel-engine parts and automotive accessories had unusual difficulty in spot-welding a continuous flange on the ferrule of an automotive oil filter. This weld must be not only airtight, but also gas-tight. With the conventional spot-welding equipment used on this job, however, the rejects were running as high as 20 per cent.

Trouble was eliminated by installing a timer whose action is based on a controlled, pool-type, rectifying tube. With the close control which this timer exercises over the length of time that the welding current flows, rejects on the filter ferrule have been reduced to about 0.5 per cent.

Portable pH Meter Repaid Its Cost Quickly

Trouble experienced by an Ohio manufacturer of enameled ware led to an investigation which showed that the difficulty could be overcome by adjusting the pH of the enamels. A portable pH meter that can be used successfully by operators without technical training was purchased and has been in service for more than a year.

It repaid its cost quickly because it has made possible a system of controlling the pH of enameling materials that led to an increase in production and greatly improved quality of product. Tests are made during the process of manufacturing the components of the enamels, and when necessary the pH is adjusted to the proper value.

Carbide Tools Save $35 Every 8 Hours

Machining ¾-inch red brass tailpieces is one operation on which a valve manufacturer was able to make a sizable saving. Complete machining, except for cutting threads, requires two chuckings.

With the former tools used, the speed

HINGE FOR GAS STOVE USED TO COST 12c; NOW IT COSTS 2

Use of a spring-tension fastening or special design of nut enabled a Cleveland stove manufacturer to lower the cost of a gas-stove door hinge from more than 12 cents to 2. With these special nuts it was possible to reduce four parts to one, thereby eliminating a casting, a tapped and hardened plate, as well as the drilling of several holes

ranged from 330 to 450 r.p.m., and the output of the 5-station automatic used was 119 pieces per hour. The number of pieces per grind was 250 for the roughing cut and 1,000 pieces for the finishing cut, on both the first and the second chuckings.

When cemented carbide tools were put on this job, the output of the machine was raised to 211 pieces per hour, although the former speed and feed were not changed. Number of pieces per grind was increased from 6 to 9 times or more.

It is estimated that the savings on this operation amount to about $35 every 8 hours. Since the new tools cost about $74, they pay for themselves in 17 hours of operation.

High-Frequency Coils Cut Heating Cost 50%

Use of induction heating by means of high-frequency coils brought about radical changes in the manufacture of laminated rotors for record players.

For example, it was found possible to eliminate 12 rivets; the diameter of the part was reduced 1 inch; weight 48 per cent; number of laminations was cut from 16 to 12; hobbing and broaching of teeth were eliminated.

As the result of these changes and savings, the cost of the motors was reduced more than 50 per cent and output was increased 1,000 per cent.

Cuts Assembly Time 50%

In the manufacture of precision frequency monitors used in connection with amateur radio sets, one of the most important requirements is that all parts be held rigidly in place. Any loosening of the fasteners used to join or mount the parts must be avoided.

It is equally important that users of the equipment refrain from removing either the front or the rear panel of the monitor.

One manufacturer of such apparatus has found that the first requirement, preventing the loosening of parts, can be accomplished better by the use of hardened, self-tapping screws than by any of the conventional methods of fastening. To prevent tampering, the front and rear panels are assembled with recessed-head, self-tapping screws.

Machine screws with nuts and lock washers had been used previously, but it was found that they tended to become loose under vibration in transit, and while in use. It was therefore necessary to abandon them.

Use of self-tapping screws not only resulted in a better product, but there is also a saving of at least 50 per cent in assembly time and a 50 per cent increase in production speed. Elimination of extra labor and materials has made a saving of about 80¢ per unit.

Welding Control Pays in Less Than a Year

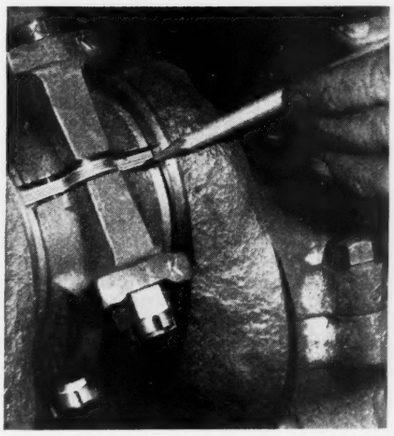
During a search for cheaper and better methods, the operations and equipment employed by a manufacturer of auto trucks were subjected to careful study.

Investigation of high-speed spot-welding equipment showed that a re-

cently developed control for such machines would affect important economies. Accordingly, one was installed on each of the seven welders.

Immediate results were a reduction in the cost of maintenance on these machines and practical elimination of rejects. In addition, the savings due to increased life of the electrodes were found sufficient to pay for the new controls in considerably less than a year.

FOR CLOSER FIT, PEEL



Shims that can be peeled are not only time-savers but also aid to correct adjustment. That is the experience of York Ice Machinery Corporation, York, Pa., which uses them in fitting box to crankpin in connecting-rod assemblies for its ammonia compressors. Precision adjustment is likewise possible during service because the paper-thin laminations may be simply peeled off the "solid" shim to give the desired close fit

Saves 70 Minutes in Bringing Furnace to Heat

A heat-treating furnace approximately 2 feet wide, 3 feet long, and 20 inches high, in the plant of a bolt and nut company, was relined with 4½ inches of a light-weight cellular refractory insulating material, backed up with 2 inches of a light-weight block insulation. The arch was coated with a refractory finishing material. This furnace has a special hearth underfired by gas.

The previous heating-up time was 90 minutes, but the furnace now comes up to temperature in 20 minutes, using six burners instead of eight.

In commenting on this installation, one official of the company said that he never realized one furnace could make so much difference in fuel costs.

Controlled-atmosphere heat treatment adds to die life, saves $1,500 per year

Increases Die Life 333%

Tool engineers of a plant in the metalworking industry were able to increase the life of a certain die from 12 hours to 40 hours at a saving of $1,500 a year in addition to the incidental savings that accrue from reduction of the down time of machines, labor costs of changing dies, and so on. This increase in the life of the dies came about as a result of careful planning of the heat treatment and the use of equipment that permits close control of conditions during that operation.

Steel from which the dies are made is a water-hardening type containing about 0.90 per cent carbon. The dies are heat-treated in a controlled-atmosphere furnace with "hump" control.

Cuts Assembly Time 80%

In the assembly of medallions on automobile tail lamps and radiator grilles, a special spring fastening of tubular shape with a retaining collar was designed to snap into the hole, where it serves as a receiving lock for the integrally cast stud of the medallion. With this arrangement, assembly of the parts has been reduced to the simple operation of snapping the spring fastening into its hole, and pushing the medallion into the fastening.

In many instances the time required to mount the medallion in place has been reduced 80 per cent.

Reduces Wheel Cost from 52c to 32c an Hour

One of the automobile manufacturers is grinding high-quality rollers. This is a centerless operation, and its success depends on the maintenance of fast, continuous output. Wheel changes, wheel dressing, and other factors that necessitate shutting down the machine are costly.

This concern was pleased to find a wheel that lasted 300 hours, although it was often necessary to shut down for dressing. Replacements, however, frequently slipped to a life of 200 hours; others showed poor cutting qualities. Average production for the life of a wheel amounted to about 1,200,000 pieces, at a wheel cost of 52¢ an hour.

Studies were then made, specifica-

tions written. Replacements now meet these exacting standards. Wheel life has been boosted to 400 hours or 1,700,000 pieces at a wheel cost of 32¢ an hour. This represents a saving of 37.5 per cent.

High-Frequency Furnace Makes Better Needles

To a manufacturer of automatic phonographs the fact that the needles then used could play only one record satisfactorily, after which they had to be replaced, was a source of much annoyance.

Installation of a high-frequency induction furnace that produces temperatures up to 5,000 degrees Fahrenheit made it possible to develop precious-metal-alloy needle points that can play 2,000 records before they have to be changed.

POWER TOOLS SAVE TIME

Hand-operated spiral screwdriving was too slow in assembling aluminum, copper, and stainless steel moldings that hold plate glass in store fronts. Electric screwdrivers made it possible to cut the time, also lessened fatigue

Molded Plastic Replaces Die Casting, Saves 40%

A manufacturer of carbonated water syphons reduced production costs approximately 40 per cent by making the syphon heads entirely from a molded plastic material.

Formerly the head was a die casting covered with a molded plastic shell. The new construction requires fewer parts, with a resultant saving in assembly time and labor.

Inert Gas Producer Cuts Cost of Blowing Varnish

Installation of inert gas generating equipment at the Cleveland plant of The Glidden Paint & Varnish Company, has resulted in an annual saving of very respectable proportions. This unit burns 160 cubic feet of natural gas per hour, after it has been carefully mixed with filtered air, and delivers 1,500 cubic feet per hour of absolutely inert gas whose composition in percentage is nitrogen, 88; carbon dioxide, 10; carbon monoxide, ½ to 1; water vapor, a fraction of 1 per cent. The inert gas thus produced is delivered to a 15,000-gallon storage tank where it is maintained under pressure to be piped throughout the plant at 3 pounds per square inch pressure.

Prior to the installation of this equipment pure carbon dioxide from dry ice was used for all blowing operations. At least 250 pounds were used per day at a cost of not less than 3 cents per pound. Now the annual gas bill for the inert-gas machine runs only $240 per year, much less than the former cost.

It is the intention to protect the material in the company's 400 varnish storage tanks, totaling 1,500,000 gallons capacity, with inert gas, to prevent skinning and promote tank cleanliness. When an inert-gas atmosphere is maintained over stored varnish, slow oxidation of the varnish is prevented, resulting in a considerable saving in varnish and the elimination of expensive shutdowns and troublesome cleaning.

Building up tools with a hard-surfacing material increases output 3 times

Trebles Tool Life

Boring tools used in one plant in finishing hubs of cast car wheels formerly could handle only about 30 pieces before grinding became necessary. After building up these tools with a hard-surfacing material deposited by the electric arc, it was found that the output between grindings was three times as much as formerly. In other words, 90 wheels can be finished with one grinding.

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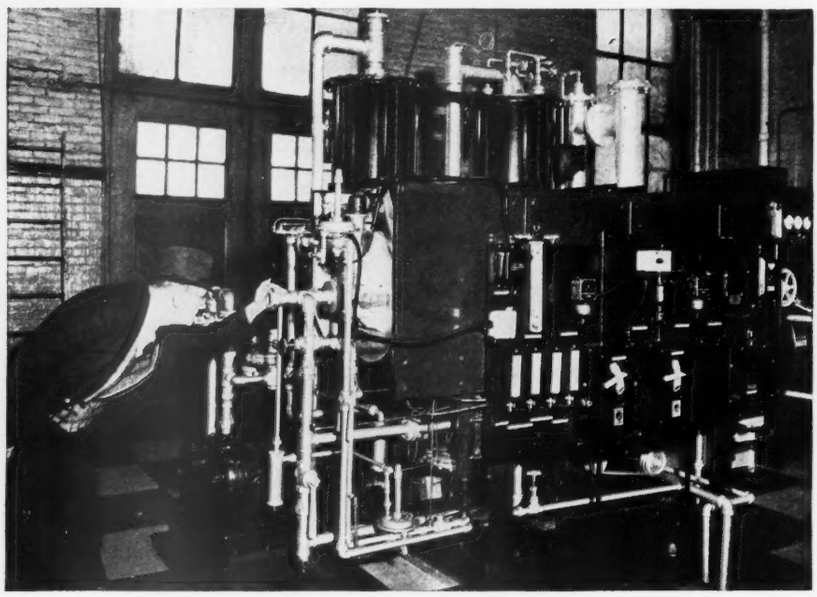
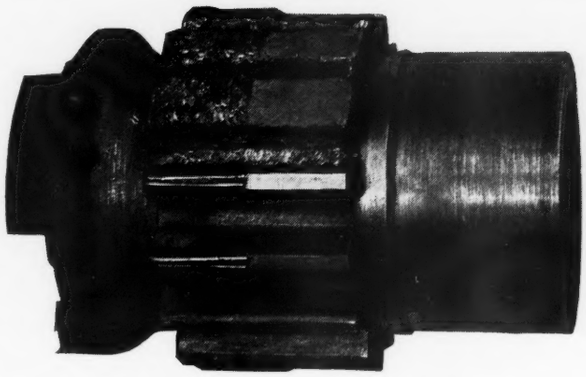
Change of jig design and purchase of a better drill cut drill consumption on a series of operations from 72 to 12 per day.

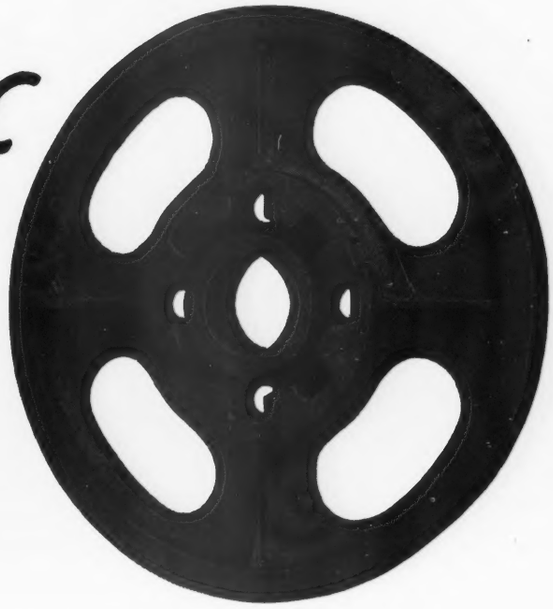


Cost of blowing varnish used to run $7.50 per day; now it is only $240 a year

DO THESE THINGS, TOO

WITH P&H *SMOOTHARC* WELDING ELECTRODES



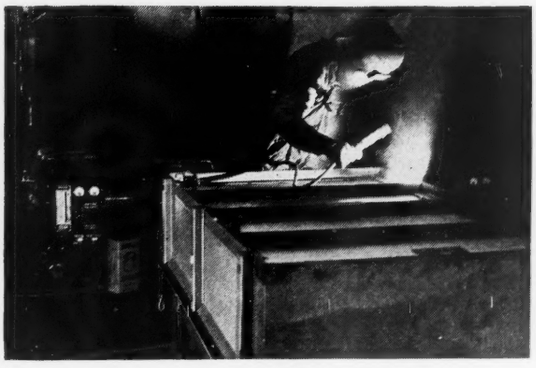


REBUILD WORN-OUT GEARS AT 1/6 OF REPLACEMENT COST

Above is shown a clutch pinion which the user reclaimed at only 1/6 of the replacement cost. The total expense, including Smootharc "110" electrodes plus labor cost in welding and machining, was only $12.55, as compared with $79.00 for the replacement cost of a new pinion. $66.45 was saved. Welding procedures for jobs like this will be sent upon request.

COMBINING STEEL CASTINGS AND STEEL PLATES WITH SMOOTHARC "AP"

A saving of 15% in weight and 20% in cost was made in this welded gear clutch blank built from a steel plate and a steel casting. The rim is high carbon (SAE 1040) steel. The web of mild steel. The jaw clutch hub is cast steel. The low heat required when welding with Smootharc "AP" together with its excellent ductility, makes this electrode ideal for this type of work. Ask for welding procedures.



SMOOTHARC "PF" SAVES TIME IN WELDING TRAILER BODIES

Producing a smooth bead with very little spatter, "PF" develops a tensile strength of 75,000 to 85,000 lbs.; ideal for welding structural steels.

A NEW 200-AMP. ARC WELDING SERVICE

The new P&H square frame welder takes only 3½ sq. ft. of floor space; it is a simplified, precision-built welding service at a surprisingly moderate price. Ask for Bulletin W-26.

Smootharc electrodes are kept "factory fresh" in air-tight containers. Ask for Catalog R-5 which describes the complete line.

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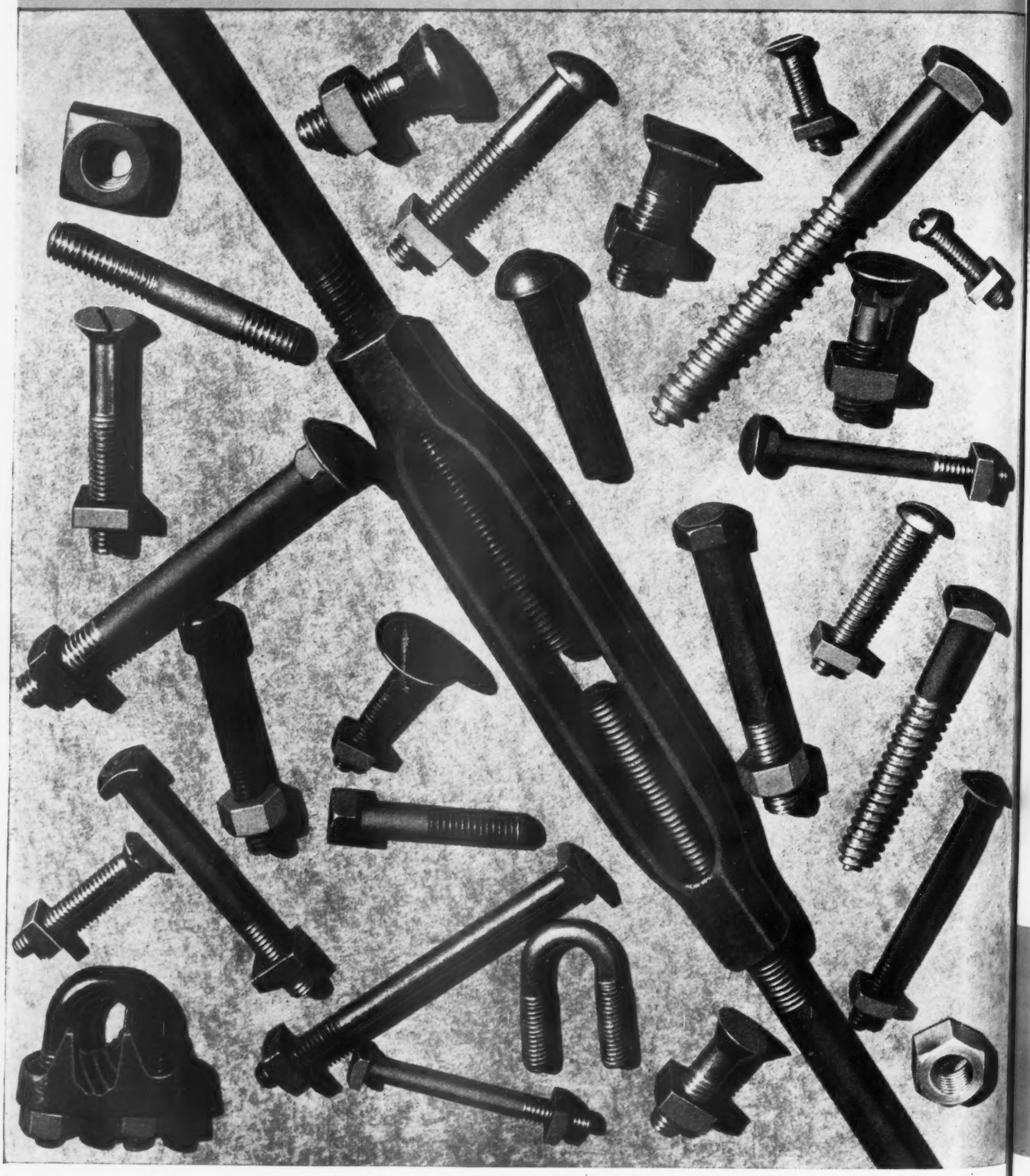
BOLTS may seem



commonplace to you

-BUT NOT TO

REPUBLIC

• Republic does not dare consider bolts and nuts as commonplace items. Republic knows that variations in strength, size, shape, threads and finish can disrupt modern, high-speed assembly — can lower the quality of a product or structure — can endanger its use. And Republic exercises every precaution, every modern facility to insure uniform production and accurate testing. Republic takes no chances — uses its own ore — makes its own steel — employs modern machines and furnaces — even makes its own bolt dies and hand-inspects every Republic Upson Quality Bolt and Nut.

You may never have considered that a change in bolts and nuts may improve your product. You, too, may have thought of them as commonplace items. Don't! They're just as important as any other material you use. Tell us what you need in headed and threaded products—let us show you what Republic can do for you.

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Announcing the Great New

Thor

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HALF-INCH ELECTRIC DRILL

$35.00

New Price!
New Power!
New Performance!

Here is a new half-inch capacity electric drill for general light-duty service that brings you Performance *plus* Economy. The Thor Drill Champion is amazingly low in price, yet you get *all* the features that have made the name Thor the symbol of quality in portable power tools for nearly fifty years.

This new half-inch drill is small and compact. It is light and perfectly balanced. It's rugged and sturdy. The motor . . . the most efficient ever put in a tool in this price class . . . has generous overload capacity.

Look at the lines of this new Thor ½" Drill Champion. One glance tells you that here is a tool that's easy to handle. Look at the compact sturdiness! You *know* that this torpedo-like housing is built to take it! And inside! If you like mechanical excellence you'll get a kick out of construction that rivals a fine watch for precision and the Boulder Dam for ruggedness!

But, try the Thor Drill Champion yourself for general maintenance, installation or light production work in wood or metal and you'll see why there isn't a low-cost drill in the running with it today. Send the coupon for a FREE Trial now, and check the merits of this economical tool.

SPECIFICATIONS

CAPACITY	In steel, ½"
FREE SPEED	450 r.p.m.
WEIGHT	9¼ lbs.
LENGTH OVERALL	15 in.

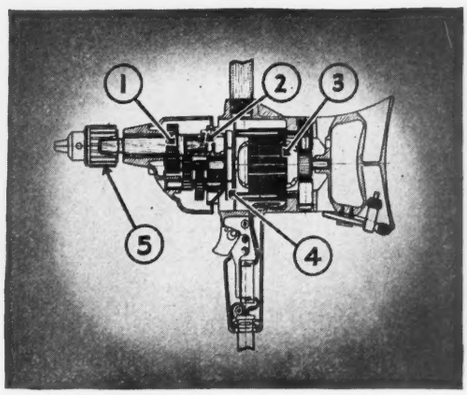
Universal motor, 110 or 220 volts. Jacobs Chuck and Key, Trigger Switch with locking pin handle, Spade handle, Dead handle. 3-conductor cable and plug.

The Next Electric Drill, Screw-driver, Grinder, Sander, or Hammer You Buy . . . Remember . . .

"Got a Job for a *Producer in an Electric Drill?* Then the new *Thor* ½" Drill Champion is *Your* Tool!"

"LOOK AT THE QUALIFICATIONS of this applicant for your all-around, light-duty drilling jobs! The new Thor Drill Champion is powerful, sturdy and mighty low in price. It's got everything, too . . . for example . . . "

"DO YOU WANT PERFORMANCE? Touch the convenient trigger-switch and discover the results of the Thor Drill Champion's greater power per pound of weight. Feel the balance of its torpedo-like housing. Check the handling ease of its compact construction."



"DO YOU WANT MECHANICAL EXCELLENCE? The new Thor Drill Champion has features you'd expect only in far costier drills!"

1. Alloy steel spindle with keyed gear mounting.
2. Oil-lite bearings for long, smooth service.
3. A really powerful universal motor.
4. Ample ventilating slots to keep motor cool.
5. 3-jaw Jacobs Chuck with key.

"DO YOU WANT A LOT FOR YOUR MONEY? If you like a real bargain the new Thor Drill Champion at $35.00 will be *your* next half-inch drill. Better get all the facts (or a Free Trial) right now. Use the coupon below."

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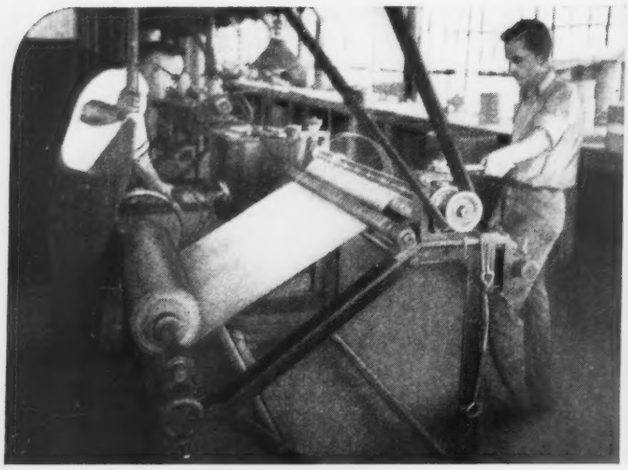
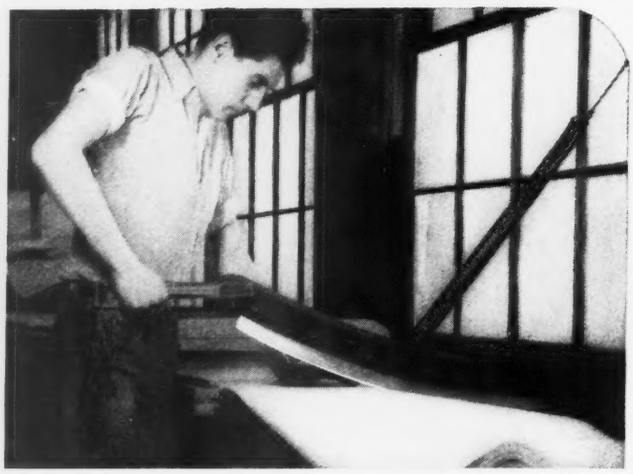
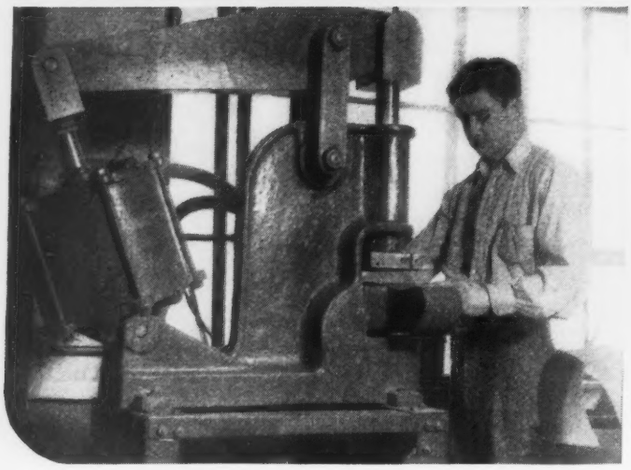
TO GET YOU OUT OF A FINISHING JAM!







VELVET JOINT

The Jewel *Velvet Joint* represents one of the greatest improvements in abrasive belt-making in a decade. *Velvet Joint* belts lie smooth, and do not bump or jump under the work. Super-adhesives, plus painstaking workmanship, plus the *Velvet Joint* method – add hours to the productive life of Jewel abrasive belts.

The minute your order for a sanding belt or other specialty hits our desk, *things begin to happen!* The flexible AP production schedule – *designed* to be broken – goes into action . . . smoothly, swiftly, because *your* time is valuable.

Cutting . . . skiving . . . joining . . . packing in special protecting containers. In less than 48 hours *guaranteed*, your order is on its way to your finishing room.

When broken belts mean broken schedules, delays can be costly. But there's no need to wait a week or two for deliveries – why do it? Specify AP on your next abrasive order – if your jobber can't supply you, write us direct. Abrasive Products, Inc., 519 Pearl St., South Braintree, Massachusetts.

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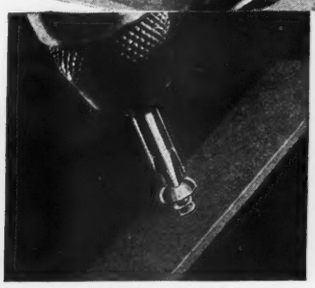
PHILLIPS RECESSED HEAD SCREWS GIVE HIM THREE HANDS · · APPROXIMATELY DOUBLE THE PRODUCTION LIGHTEN HIS EFFORT REQUIRED CUT DOWN HIS REJECTIONS

THE SCREW CLINGS TO THE DRIVER . . . so he has one hand free to hold the work.



POWER DRIVING SPEEDS UP HIS WORK . . . there is no danger of driver slippage.

TRIPLE CONTACT WITH THE DRIVER . . . reduces the driving effort required.

SCREWS ARE DRIVEN HOME SAFELY . . . because Phillips Screw heads won't split.

YOU WOULDN'T PLAY EVERY SHOT WITH ONE DRIVER

Shape, taper and depth of the genuine Phillips recess were determined after thousands of tests. The recess utilizes the driver's maximum turning power without sacrifice of strength in the screw head . . . without danger of shearing the metal.

For efficient driving, contact between recess and driver should extend as far as possible from the screw's axis. On the other hand, too big a driver means stripping threads or tearing fibre structure of wood or metal. Thus it requires four driver sizes to drive properly the entire range of recessed head screws. Two sizes of Phillips Drivers handle diameters #5 through #16 or approximately 85% of all screws driven.

PHILLIPS *recessed head screws*

MACHINE SCREWS · SHEET METAL SCREWS · WOOD SCREWS · STOVE BOLTS

U. S. Patents on Product and Methods Nos. 2,046,343; 2,046,837; 2,046,839; 2,046,840; 2,082,085; 2,084,078; 2,084,079; 2,090,338. Other Domestic and Foreign Patents Allowed and Pending.

This Booklet will help your plant to cut fastening costs and improve assemblies. Address one of the firms below for free copy.

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Continental Screw Co., New Bedford, Mass.
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National Screw & Mfg. Co., Cleveland, Ohio
Parker-Kalon Corporation, New York, N. Y.
Pheoll Manufacturing Company, Chicago, Illinois
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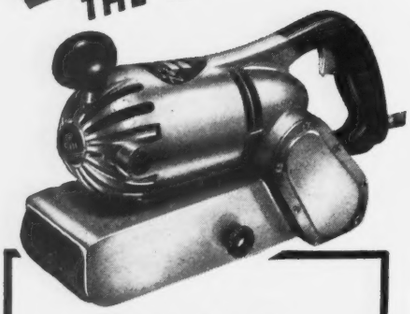
IT COSTS LESS TO USE PHILLIPS SCREWS

To remove scale . . . to get a smooth finish on bronze elevator doors

BALDWIN BRASS WORKS use

SKILSAW Zephyrplane

THE MODERN 3 IN. BELT SANDER



HERE ARE ITS OUTSTANDING FEATURES

- Patented lever makes belt-changing quick and easy.
- Knob handle can be moved from top to the nose of sander for greater convenience when sanding vertical surfaces.
- Perfectly balanced for even pressure on entire sanding surface.
- Lighter, easier to handle, weighs only 13¼ lbs.

Ordinary sanders tear the metal . . . hand sanding is too slow and costly — so Baldwin Brass Works of Chicago chose the SKILSAW ZEPHYRPLANE to make their finishing operations quick and profitable. Working at a special belt speed of 750 R.P.M., ZEPHYRPLANE now removes the scale and puts a satin-smooth, scratchless surface on the high grade bronze elevator doors that this company manufactures.

ZEPHYRPLANE saves time and money in every industry, wherever sanding or finishing is done on metals, wood or compositions. Special belt speeds available for aluminum, bronze, copper and stainless steel surfaces. Plugs into any light socket.

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. . . THERE'S A DISSTON BITE-RITE FILE TO DO EVERY JOB BETTER, FASTER

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You get the right file to do your job better, faster. And Disston Bite-Rite Files give you these added advantages:

Teeth staggered like a harrow; cut, smooth, level at each stroke. Correct contour of cutting tip, rugged shoulders between the teeth.

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Disston Engineering developed this file which combines speed of cut, long life and smoothness of filed surface.

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BITE-RITE

New Disston File

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of 15 ton lathe spindle

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You'll find these husky Van Dorn Drills speeding operations in sheet metal assembly, electrical equipment assembly, cabinet and body work and lead-hole drilling for screw driving operations. These new units are much lighter in weight and a full two inches shorter than previous models. Spindle offset has been reduced to a minimum and Van Dorn's new, proven spindle bearing and splined mounting assure long, trouble-free life.

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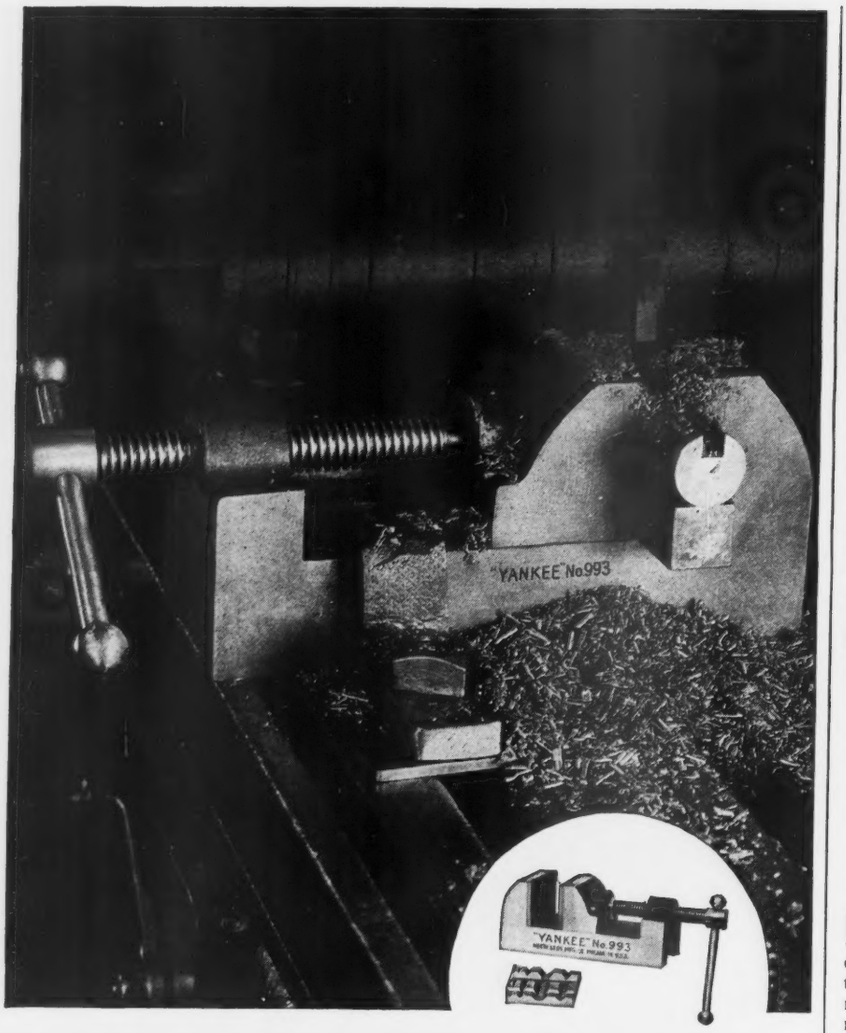
"Van Dorn"

THE "RED-HEADED" PORTABLE ELECTRIC TOOLS



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"Yankee" is a *fast-production* vise—different from any other vise in your shop! Squared all sides. Designed for continuous work—from bench to machine and back again—accurate results and no delay. "Yankee" Vise illustrated above, made in four sizes: No. 991, 1½" jaw width. No. 992, 2" jaw width. No. 993, 2¾" jaw width. No. 994, 4" jaw width. Hardened steel block, V-grooved, supplied for holding rounds.

"Yankee" Vise also available with removable swivel base. Sizes, Nos. 1991, 1992, 1993 and 1994.

ORDER FROM YOUR SUPPLY HOUSE. FOR "YANKEE" VISE CIRCULAR, WRITE NORTH BROS. MFG. CO., DEPT. F, PHILADELPHIA, U. S. A.

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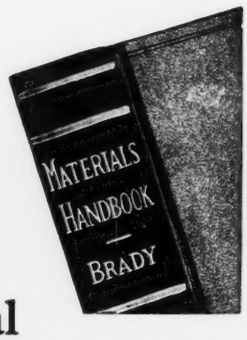

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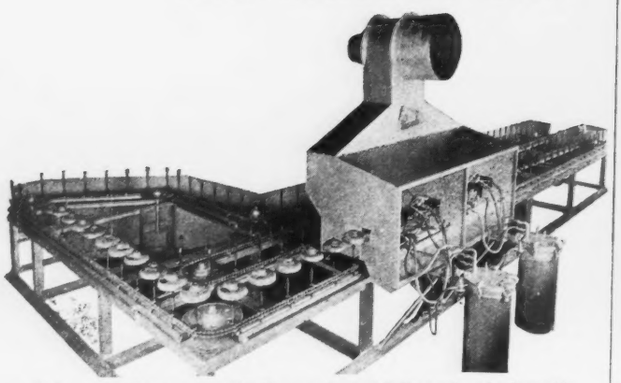

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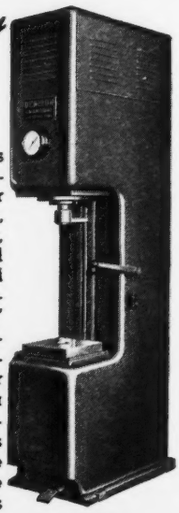

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USS Scully Service

THE name "Scully" has become a synonym in the steel business for prompt, friendly service. A constantly growing list of customers—today totalling many thousands—has learned that no matter how small or how large an order may be it will always get the same treatment from Scully. Each of our 8 conveniently located warehouses works on the principle that customers want friendly contacts and prompt deliveries. If you're not one of our customers now, "Call Scully" the next time you need steel, steel products, copper or brass. And if you do not have a copy of our handy Stock List and Reference Book, be sure to ask for one—it's free, of course.

"Just a line to let you know how much we appreciate the handling of our above order number. This order was telephoned to your office late yesterday evening and the material was received at our plant about 1:30 P.M. today. Assuring you that this service is very much appreciated and one we will remember, we are . . . "

When you re-tube boilers—remember Scully

SCULLY STEEL PRODUCTS COMPANY

Distributors of Steel, Steel Products, Copper and Brass

Warehouses at

CHICAGO · NEWARK, N. J. · ST. LOUIS · BOSTON · ST. PAUL—MINNEAPOLIS
CLEVELAND · PITTSBURGH · BALTIMORE

UNITED STATES STEEL

THE PROFIT COLUMN

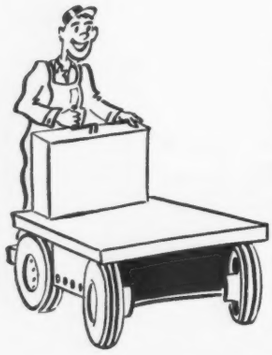
News about money-saving neoprene products for the plant

NEW TYPE WORK GLOVE

Several manufacturers (names on request) are now making work gloves of canvas impregnated with neoprene for jobs involving contact with oil and grease. Oil and grease, of course, have a deteriorating effect on plain canvas and on rubber. It isn't unusual for neoprene-impregnated or neoprene-coated gloves to outlast rubber-treated gloves four to one.

LONGER-LASTING DROP CORD

Of course *any* drop cord covered with high-grade rubber would last indefinitely if you coddled and pampered it, especially if you kept it away from all oil and grease. But obviously you can't do that. So, since oil and grease rot rubber, several manufacturers (names on request) are making drop cord covered with neoprene. This neoprene cord lasts much longer than even highest grade rubber-covered.



OIL-RESISTANT TRUCK TIRES

Alert makers of industrial truck tires (names on request) have recognized the demand for a superior resilient tire which will resist wear even when exposed to oils, chemicals, and heat. So now you can get an entirely new type of industrial truck tire for that kind of severe service. The tread is made of neoprene, and it isn't uncommon when these tires last 30% longer than tires with even highest grade rubber treads.

WHAT IS NEOPRENE? *Neoprene is Du Pont's remarkable new chloroprene rubber, made from coal, limestone and salt. It has the strength, resilience and toughness of natural rubber—but it is far more resistant to oils, heat, gasoline, sunlight, ozone, and even corrosive acids and gases. Better try it.*

DU PONT NEOPRENE

REG. U.S. PAT. OFF.

E. I. du Pont de Nemours & Company (Inc.)
Rubber Chemicals Division . . . Wilmington, Delaware

Make This Issue WORK FOR YOU

This issue of FACTORY has hundreds of ideas—to help you reduce operating costs. These ideas are useful only if you put them to work.

Here's what typical readers told us of FACTORY'S previous "Quick Ways to Profits" issues:

"I checked 27 items that I am sending out to 14 persons in our organization for their consideration."

"I am passing this issue on to operating men in my department, asking them to list 10 specific items that they think will be helpful to our operation."

"I am in the midst of reviewing the issue in detail myself, after which I propose to hand the issue to our Methods Department and ask them to check each section."

"I have found this issue most interesting. I sat down of an evening and read it from cover to cover just like a gripping novel. Many of the sections that apply to our problems I marked and then passed the magazine on its rounds through the factory."

"I should like very much to have another copy of the November issue, as I intend to make clippings of the one I now have and route the different sections to the heads of the departments who would be most interested."

"We would like to get several copies of the November issue of FACTORY. These are to be used in mill council meetings in our nine plants."

Put to work in 1876

AND STILL IN GOOD CONDITION

because this nail was...

HOT DIP GALVANIZED

When Grant was President, this nail was driven into a roof at the old Peach Bottom Quarry near Treichlers, Pa. 47 years in this building and 16 more in the mud beneath, this Hot Dip Galvanized Nail is one of many recently discovered which, although showing signs of wear in their zinc coatings, were entirely untouched by rust. Hot Dip Galvanizing is still the greatest value in rust protection known to modern science. Be sure that your galvanizing is Hot Dip Galvanizing . . . for only this process guarantees an adequately thick coating of zinc and a union between zinc coating and base metal that makes each an **inseparable** part of the other.

Patronize members of this association and **know** that you are getting (1) good value (2) expert workmanship (3) a **genuine** Hot Dip job every time. Our specification folder will help you in your buying. Write for your free copy. American Hot Dip Galvanizers Association, Inc., American Bank Building, Pittsburgh, Pa.

IF IT CARRIES THIS SEAL IT'S A JOB WELL DONE

No. 2 in a series of advertisements featuring service histories of various Hot Dip Galvanized products... FROM OUR FILES —CASE NO. 0735. Roofing nails used by Ringer & Kline on slate shingles at Grum Building 1876.

Acme Galvanizing, Inc., Milwaukee, Wis. ★ Acme Steel & Malleable Iron Works, Buffalo, N. Y. ★ American Tinning & Galvanizing Co., Erie, Pa. ★ Atlantic Stamping Co., Rochester, N. Y. ★ Buffalo Galvanizing & Tinning Wks., Inc., Buffalo, N. Y. ★ Columbian Steel Tank Company, Kansas City, Mo. ★ Diamond Expansion Bolt Co., Inc., Garwood, N. J. ★ The Fanner Mfg. Company, Cleveland, Ohio. ★ John Finn Metal Works, San Francisco, Cal. ★ Thomas Gregory Galvanizing Works, Maspeth, N. Y. ★ Hanlon-Gregory Galvanizing Co., Pittsburgh, Pa. ★ The Hodell Chain Company, Cleveland, Ohio. ★ Independent Galvanizing Co., Newark, N. J. ★ International Derrick & Equipment Co., Columbus, O. ★ Joslyn Co. of California, Los Angeles, Cal. ★ Joslyn Mfg. & Supply Co., Chicago, Ill. ★ L. O. Koven & Brother, Inc., Jersey City, N. J. ★ Lehigh Structural Steel Co., Allentown, Pa. ★ Lewis Bolt & Nut Company, Minneapolis, Minn. ★ Missouri Rolling Mill Corp., St. Louis, Mo. ★ The National Telephone Supply Co., Cleveland, Ohio. ★ Penn Galvanizing Co., Philadelphia, Pa. ★ Riverside Foundry & Galvanizing Co., Kalamazoo, Mich. ★ San Francisco Galvanizing Works, San Francisco, Cal. ★ The Sanitary Tinning Co., Cleveland, Ohio. ★ Standard Galvanizing Co., Chicago, Ill. ★ Wilcox, Crittenden & Co., Inc., Middletown, Conn. ★ The Witt Cornice Co., Cincinnati, Ohio.

In factory assembly and service adjustments

Our new chart classifies approved uses of LAMINUM shims and shim stock throughout a score of industries . . . from aviation to diesels. With nearly fifty photographs of applications, it demonstrates the latest methods in factory assembly and service adjustments. The chart will show you what savings and precision are now made possible by LAMINUM . . . the "solid" brass shim that simply P-E-E-L-S for accurate adjustment—right at the job. Your choice of .002 or .003 inch laminations. (A Laminum sample will be mailed you together with the chart.)

LAMINATED SHIM CO., INC., 21-88 44th Ave., L. I. City, New York, N. Y.
CLEVELAND DALLAS HOUSTON LOS ANGELES MILWAUKEE TULSA

LAMINUM
TRADE MARK

THE SOLID SHIM THAT *peels* FOR ADJUSTMENT

WIRE

IRON • STEEL • ALLOY

•

All Sizes and Shapes and for all purposes

•

Highest Quality and Service Guaranteed

•

Established 33 years

IRON STEEL WIRE "SENECA" QUALITY TRADE MARK

The Seneca Wire & Mfg. Company

FOSTORIA, OHIO

Representatives and Warehouses in many principal cities

"These Low Cost Drill Presses Are Saving My Hide" . . .

Because they not only enable me to cut costs—but I can get them NOW—without waiting months for delivery!" Manufacturers everywhere are telling us the same story—of how Delta drill presses are giving them an edge on competition.

We have scores of dramatic illustrations of this in our files. Here's why: Delta Drill Presses cut labor costs, increase flexibility, save on special setups. They give you durable precision machines at a fraction of the cost of heavy machines. For instance: The unit here illustrated gives you

Many Special Features

Five speeds: 385, 600, 935, 1450, 2240 R.P.M. Floating Drive; Preloaded double-seal ball bearings; 16 tooth splined spindle; Table Raising gear; Head-Raising gear; Tilting or production table; Completely enclosed belt; Safety spring wind; Foot power feed. Overall dimensions 66" high; 18" wide; 27" front to rear. Tilting table 11" x 12". Production table 12½" by 17" surface. Floor base 10" by 13¾" table surface. Shipping weight 340 lbs. Separate drill press heads available. Also high speed bench models and 2 spindle models.

$89.50
with motor pulley and belt but without motor.

SEND FOR DRILL PRESS BOOK

Mail coupon for latest Delta Drill Press Book. It contains specifications and prices of complete line of Delta Drill Presses plus details on individual parts from which you can make your own low-cost assemblies.

DELTA
MANUFACTURING CO.
(INDUSTRIAL DIVISION)
668 E. VIENNA AVE.
MILWAUKEE, WISCONSIN

Delta Mfg. Co.
(Industrial Division)
668 E. Vienna Avenue
Milwaukee, Wis.

Gentlemen: Please send me your latest Delta Drill Press book which contains specifications and prices of your complete line of Drill Presses.

Name .....
Address .....
City ..... State .....

Pieces of Eighty

Excerpts from a Book about a History-making Invention

#47 A mechanically cleaned Cuno installed on the job (described in book) made an 18% reduction on rejections.

#59 A *continuously cleanable* Cuno, handling 86 gallons per minute of (described) fluid, was checked after 3 years in service and found perfect.

#60 The engineering department of one manufacturer reported their cost of (described) was reduced *seventy-five per cent* after their Cuno filter was installed.

#64 What did Cuno do at Boulder Dam?

Read about these extraordinarily interesting cases in our new book. It'll open your eyes to the flaws in old fashioned stop and go straining . . . and show you how to save money to boot. Use the coupon below. The book's free.

ONE quick revolution cleans the Cuno Auto-Klean filter — without interrupting the flow. It's the Cuno principle of edge filtration, giving *continuous* protection.

There is no need for expensive duplex installations — nothing to do but install — and run.

Other Cuno *continuously cleanable* filters remove extremely fine particles and abrasive solids as small as .001". You name your conditions. We have the filter to fit them, even if they include air or gases. Get Cuno *continuous* savings.

Cuno Engineering Corporation
571 South Vine St.
Meriden, Connecticut
Please send me, free, "80 Ways to Make More Money."

Name.....

Company..... City..... State.....

Street.....

avoid stop and go with CUNO *Filters*

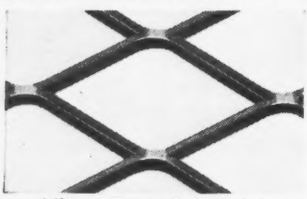
CUNO ENGINEERING CORPORATION ★ MERIDEN, CONNECTICUT

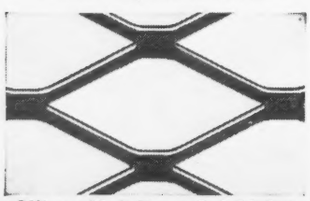
1 ... *of improving the salability and appearance of your finished product*

2 ... *of protecting your workmen*
(by using it as a machine guard material)

3 ... *of preventing property loss*
(by using it as a guard and partition material)

Milcor Expanded Metal helps you improve the utility of your finished product, or reduce its cost, or both. It allows designing freedom, for it can be cut in any direction to form the desired shape economically. Strands cannot ravel or loosen. Stronger than solid metal, because expanding process increases tensile strength. Costs no more than perforated metal.


Milcor Expanded Metal


Milcor Flat Expanded Metal

Because it provides adequate protection, light, ventilation, vision — it is well suited for the construction of machine guards, stock room enclosures, window guards, and other factory maintenance purposes. ½", ¾" and 1½" standard mesh — 26 to 9 gauge stock in sheets 8' long and 4', 6' and 8' widths. Special fabricating facilities for unusual jobs.

Free Sample Kit!

Send for the Milcor Expanded Metal Sample Kit, containing samples of all six standard sizes, and tables of weights, etc. Write today on your business letterhead.

F-87

MILCOR STEEL COMPANY
MILWAUKEE, WISCONSIN CANTON, OHIO
CHICAGO, ILL. • KANSAS CITY, MO. • LA CROSSE, WIS. • ATLANTA, GA. • NEW YORK, N. Y. • ROCHESTER, N. Y. • BALTIMORE, MD.
Sales Offices: Minneapolis, Minn., Little Rock, Ark., Dallas, Tex., Denver, Colo., Washington, D. C., Boston, Mass.

USE THE COUPONS!

Many advertisers in this issue of FACTORY have not only given you valuable information in their advertisements, but have made it easy for you to get even more detailed data on products and services that can save you money—by inserting coupons in their advertisements requiring only your name and address.

Other manufacturers have made valuable catalogs available to you through the Catalog Service Pages found in every section of this issue.

Use them. Tap the valuable information thus easily made available to you.

Section 7 FACTORY'S Catalog Service

Production Methods and Materials

FACTORY, through the cooperation of leading manufacturers, makes it possible for you to secure catalogs, bulletins, and booklets listed here without cost or obligation. Check and fill out the coupon below and send it to FACTORY. See other sections for additional catalog listings.

1 **Air Equipment**—Series of well illustrated booklets describing complete line of air connectors, couplers, gauges, and guns designed to reduce air losses and save production cost. Also bulletins on air injection sets and new type safety controls for presses. All bulletins are complete and concise. **A Schrader's Sons.**

2 **Coated Abrasives**—General catalog covers over 2000 standard items, plus detailed information on special sizes and shapes. Sixth edition. Tabulated price list. **Abrasive Products, Inc.**

3 **Continuously - Cleanable Filters**—Book, "80 Ways to Make More Money" contains 80 examples of application of Cuno Continuously-Cleanable Filters to a wide variety of fluid handling requirements. The book is indexed by types of applications. Schematic views show how filter is cleaned without interrupting fluid flow. **Cuno Engrg. Corp.**

4 **Flame Cleaning and Descaling**—Well illustrated booklet on the use of the oxy-acetylene process for descaling iron and steel and cleaning and dehydrating fabricated structural steel. Contains complete engineering data, diagrams, and illustrations of equipment and applications. **Air Reduction Sales Co.**

5 **Gas Furnaces**—Bulletin describing two new gas furnaces. One for heat treating hi-speed steels and the other for melting and pot hardening. Contains illustrations and complete description with prices. **Johnson Gas Appliance Co.**

6 **High Tensile Steel**—48-page book containing quick facts about Dyn-el. Describes properties of this steel and explains how the high tensile strength permits the use of thinner sections and saves weight. Also tells how fabrication and welding can be done economically. Contains data on resistance to shock fatigue and corrosion. **Alan Wood Steel Co.**

7 **Hydraulic Presses**—A set of data sheets with a photograph, general description, and specifications of a new line of small capacity hydraulic presses for assembling, broaching, and straightening, etc. Presses are suited to a wide variety of applications; are small in size to save floor space. **Denison Engineering Co.**

8 **Industrial Power Tools**—Attractive bulletin, "Metal-Cutting Band Saw," describes a versatile 14-in. band saw applicable to many jobs in the shop. Describes accessories available. Another bulletin illustrates and describes a new heavy-duty shaper for wood-working with many advanced features of convenience and durability. **Delta Manufacturing Co.**

9 **Machine Tool Spindle Bearing**—A new 34-page catalog describing SKF's new spindle mounting for lathes, automatic boring mills, milling machines and grinders. Contains illustrations of installations and concise explanations of each job. Provides detailed engineering data including load rating, clearances, and detail drawings as well as information on mounting of thrust bearings and their care. **SKF Industries, Inc.**

10 **Plastics**—Sixteen-page booklet entitled "New Paths to Profits" is designed as a primer—a guide to modern plastics materials. Explains the properties and applications of bakelite materials and shows how they are being used to revolutionize product design, increase sales, and cut production costs. Discusses cast resinoids, laminated products, paints, varnishes, and other lacquers, cements, adhesives and molding materials. **Bakelite Corp.**

11 **Pneumatic Tools**—76-page catalog No. 564 describes a complete line of pneumatic tools and accessories for a wide variety of production operations. Well illustrated with photographs and diagrams. Contains specifications and capacities of equipment described. **Chicago Pneumatic Tool Co.**

12 **Portable Electric Tools**—Well illustrated 48-page catalog 35A describes complete line of portable electric tools and accessories. Describes portable tools for all types of production and maintenance operations and quotes prices as well as showing application photographs. **Independent Pneumatic Tool Co.**

13 **Portable Electric Tools**—Two new pocket size booklets illustrating and describing the complete line of Skilsaw Tools and their practicability on recommended work are now available to our readers. In these booklets facts are given relating to the savings possible in maintenance and production with portable electric hand saws, belt sanders, disc sanders, drills, etc. **Skilsaw Inc.**

14 **Recessed Head Screws**—Literature describing the advantages of Phillips recessed head screws. Tells how savings in assembly cost can be made and cites examples. **Phillips Screw Licensees.**

15 **Rotary Air Grinder**—Well illustrated booklet describes a newly announced light weight rotary air grinder noted for its compactness. Illustrates and describes all kinds of grinding wheels and accessories available. Many applications are illustrated and prices for all types of accessories are indicated. Circular T 20. **Independent Pneumatic Tool Co.**

16 **Self-Sealed Ball Bearing**—Catalog F-951-C described "cartridge" and "9,000" series of faultless self-sealed ball bearings. Describes special construction of these bearings with flanged steels, and also bearings with steels employing no felt washers. Explains how frictional resistance and drag are eliminated and provisions made so that steels will not wear. **Norma-Hoffmann Bearings Corp.**

17 **Shim Application Chart**—A comprehensive survey of proved applications for laminated shims or shim stock, listed and arranged for easy reference. Describes and illustrates installation methods and is arranged so that plant men can check shim applications and find out whether laminated shims can be used for machine assemblies or services. Data based on actual installation records. **Laminated Shim Co. Inc.**

(Continued on page 280)

Use the coupon to Secure Valuable Manufacturers' Literature

Section 7 MAILING COUPON—NOVEMBER 1939—Good Until February 28, 1940

FACTORY MANAGEMENT & MAINTENANCE
330 West 42nd Stree
New York, N. Y.

Please have the manufacturers send me, without obligation, the literature circled below. (Numbers correspond to descriptive paragraph numbers.)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27			

Name..... Title .....

Company.....

Street Address.....

City..... State .....

Please fill out this coupon completely in order to avoid delay in handling.

Dependable DEVILBISS

SPRAY-FINISHING EQUIPMENT

BUILDS CONFIDENCE AND PROFITS IN EVERY INDUSTRY... WITH PERFORMANCE

● From all industrial fronts come enthusiastic reports of the profitable performance of DeVilbiss Product-Finishing Equipment . . . and undeniable evidence of it—repeat orders.

DeVilbiss performance is the result of a planned manufacturing procedure. Every step in DeVilbiss research, engineering and production is pointed toward efficient, economical and dependable product performance . . . and conducted the best way that 50 years of experience knows how. That's why so many industrial executives know the most reliable approach to improved product-finishing is to call DeVilbiss.

Regardless of the size or shape of your product, pins to locomotives—no matter what material you apply—whatever your plant operating set-up may be, DeVilbiss has what it takes in both equipment and experience to solve your product-finishing problems profitably—you can depend on that! Just call DeVilbiss.

THE COMPLETE DEVILBISS LINE CONSISTS OF: Spray-finishing equipment . . . Automatic coating machines . . . Tanks for spray materials . . . Spray booths and exhaust fans for vapor and dust elimination . . . Air regulators, cleaners and dusters . . . Air Compressors . . . Respirators . . . Specialized hose for paint, air, water, gasoline, welding and pneumatic tools . . . Hose connections . . . Water and oil guns . . . Equipment to prevent offset in printing . . . Paint stripers . . . Medicinal atomizers . . . Perfume atomizers.

DEVILBISS SPRAY SYSTEMS

THE DEVILBISS COMPANY • TOLEDO, OHIO • U.S.A.

FACTORY'S Catalog Service
Section 7 (continued)

18 **Socket Screw Products**—A newly revised catalog describing a complete line of "Unbrako" socket screw products. Illustrates and describes complete standard line, also self locking, hollow and square head set screws and socket cap screws. **Standard Pressed Steel Co.**

19 **Spray Painting Equipment**—A complete catalog of finishing room and maintenance painting spray equipment including spray guns, material containers, spray booths and exhaust fans, air and fluid regulators, hose and connections, air compressors, respirators, paint stripers, automatic coating and finishing machines. **The DeVilbiss Co.**

20 **Spray Painting Equipment**—48-page catalog, FB10-38, lists and describes a complete line of air brush equipment and accessories including hand operated as well as automatic equipment. Well illustrated. Contains useful data on hundreds of items of equipment. **Paasche Airbrush Co.**

21 **Steel Products**—A 76-page handy reference book on the most generally used sizes of rolled steel. Contains valuable reference tables and diagrams for all types of rolled steel products. **Inland Steel Co.**

22 **Steel Stitching**—Illustrated folder "Stitching Through Steel" describes a recently developed line of equipment for mechanical stitching of steel parts. Describes many applications of this method of fastening which can be used on metals as hard as cold rolled steel sheets. **Bostitch.**

23 **Steel Stock List**—Ryerson stock list completely lists the wide range of certified steel products available in stock for immediate shipment. Also explains and illustrates the high quality of certified steels. Other special bulletins on Allegheny Stainless Steel, Timken Mechanical Tubing, Ledloy (lead-beading, free machining) Steel. **Joseph T. Ryerson & Son, Inc.**

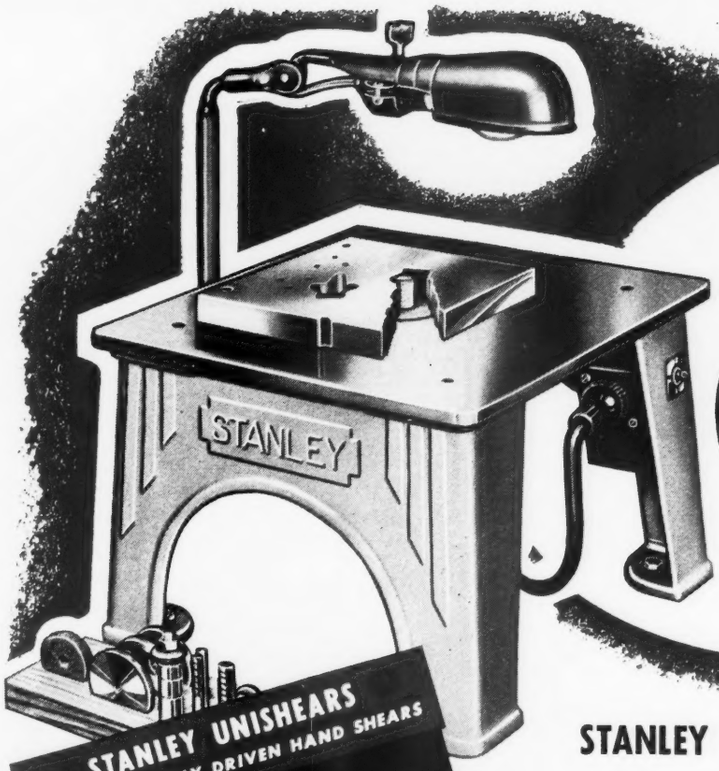
24 **Stock List and Reference Book**—Contains a complete line of steel products, copper and brass, tools and machinery carried in stock at various warehouses. Includes list prices, extras, and weights, as well as reference tables of interest and value to all users of steel. **Scully Steel Products Co.**

25 **Welding Electrodes**—28-page booklet describing complete line of "Smootharc" electrodes for all types of welding. Bulletin is well illustrated and contains valuable operating data. **Harnischfeger Corp.**

26 **What's New in Portable Electric Tools**—Catalog No. 66, 52 pages, describes and illustrates safety saws, drills, hammers, unishears and other portable electric tools for production, new construction, and maintenance jobs in every plant. Complete specifications and prices. **Stanley Electric Tool Division.**

27 **Wire Handbook**—Catalog No. 100 Convenient pocket-size handbook on all types of wire. Contains tables on wire gauges, weights, measures, data on the performance of various grades of wire. Also bulletin on flat, shaped and square wire containing specifications, tempers and other data. **Seneca Wire & Mfg. Co.**

(Check numbers on coupon page 279)



COST CUTTERS FOR 1940

STANLEY UNISHEARS
THE ELECTRICALLY DRIVEN HAND SHEARS

For fast cutting of sheet materials, any shape. Leave smooth, finished edges. No waste. No distortion. Three portable models handle up to 12-gauge hot rolled steel. Six stationary models, with capacities up to 1/4" boiler plate.

STANLEY CONTOUR GRINDER....$69.50

Compares favorably with grinders costing up to three times as much. Releases highly-paid die-makers and other skilled labor from laborious hand filing and stoning. Makes quick work of trimming non-ferrous metals; grinding dies and correcting hardening distortion; making brass templets and "finding blanks."

Features: Sturdy 12" x 12" table. 3/8 HP., 18,000 R.P.M. Direct-drive Universal Motor unit tilts 90° to 45° and is removable for lathe tool-post grinding.

TRADE STANLEY MARK

STANLEY TOOL ROOM GRINDER

Used free-hand or mounted on milling machine, shaper, lathe, or Stanley Bench Stand. Handles internal and external grinding on dies, punches, special machine parts, spiral cutters, lathe centers; also for metal cutting in non-ferrous metals. 18,000 R. P. M.

STANLEY SAFETY SAWS

Duplex Handle means easy handling. Approved safety guards. Simple wing nut adjustment for depth of cut. Six models with cutting capacities of 1 7/8", 2 1/2", 2 3/4", 3 1/4", 4" and 6" — largest capacity portable electric saw on the market.

Your Stanley Distributor also offers a complete line of Portable Electric Drills, Hammers, Grinders, Sanders, Screw Drivers and accessories. He will be glad to demonstrate any of these on your own work. Write for Stanley Electric Tool Catalog. Stanley Electric Tool Division, The Stanley Works, New Britain, Conn.

STANLEY ELECTRIC TOOLS

A COMPLETE LINE FOR INDUSTRY ... "COST LESS PER YEAR"

Another Half Dozen Places

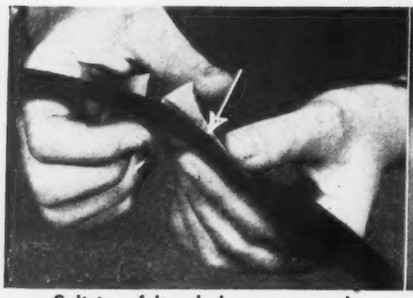
WHERE

SCOTCH ADHESIVE TAPES

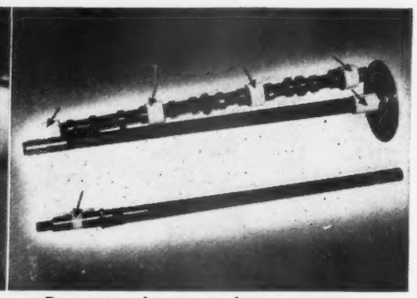
(Pressure Sensitive — Seal Without Moistening)

are an important part of manufacturing

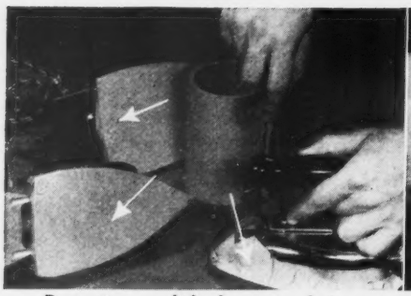
MASKING • PROTECTING • HOLDING • SEALING



Splicing felt, cloth, paper and similar materials.

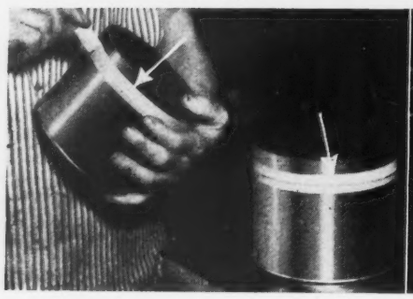


Protecting bearings during storage and shipment. Holding loose keys.



Protecting polished parts during assembly.

Reinforcing to insure longer wear.



Sealing cans and containers.

Sealing vents and openings to prevent entry of foreign materials.

Made and Patented in U. S. A. by

MINNESOTA MINING & MFG. CO.

SAINT PAUL MINNESOTA

The Desire To Serve — The Ability To Produce

Under one or more of the following U. S. Patent Nos. 1779588, 1856986, 1814132, 1895928, 1959413, 1954805, 2156380 Re Nos. 18242, 19128

Canadian Manufacturers and Distributors, CANADIAN-DUREX ABRASIVES, LTD., 154 Pearl St., Toronto, Can.

WHY NOT TRY A ROLL IN YOUR OWN PLANT

MINNESOTA MINING & MFG. CO.,
Saint Paul, Minnesota. Dept. FM1139

Gentlemen: Kindly send a sample roll of Scotch Adhesive Tape to be used for.....

.....

.....

Name.....

Address.....

City.....State.....

JOHNSON 650

Heat Treating Furnace gives powerful, even heat without blower!

A PROVEN producer . . . this Johnson furnace produces temperatures up to 1800°F with its six powerful Johnson Direct Jet Burners . . . and it does it *without air blast!* Ideal for heat-treating any carbon steels! Does most jobs without requiring muffle, and there is *no* oxidation! Perfect combustion insures lowest fuel consumption on *any* type gas. Door is 40" from ground for working convenience. Cut your heat-treating costs *now* with this famous Johnson 650!

Send for FREE Catalogue

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Additional PRODUCTS–SPECIALTIES–SERVICES offering

"QUICK WAYS TO PROFIT"

"FACTORY" WHERE TO BUY SUPPLEMENT

Buy This Genuine ½" SpeedWay Drill $24.50

At the Lowest Price ever made on a Quality Drill of this Size

- Specially Wound High Torque SpeedWay Drill Motor
- Streamlined Air Cooling Die Cast Case
- Natural Grip Direct Thrust Breast Plate Handle
- Removable Side Handle for Close Quarters
- Self Aligning Oilless Bearings
- 500 R.P.M. Operating Speed
- Smooth Sliding Thumb Switch
- Complete with hand operated 3-jaw ½" chuck, cord, plug.

SpeedWay

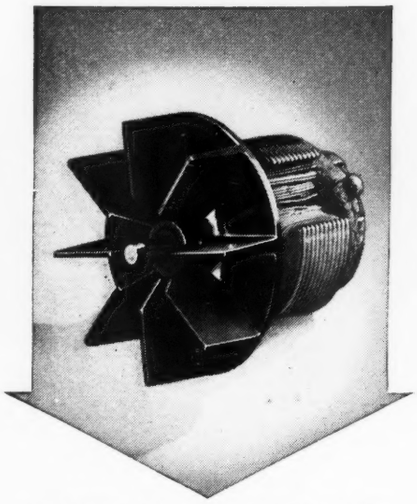
Write for circulars and name of nearest dealer. 1869 S. 52nd Ave., Cicero, Ill.

? *Find what you are looking for? If this or other advertising in this issue does not supply the information wanted, of products or services, write*

Factory Management and Maintenance
330 W. 42d St., New York, N. Y. ?

Profitable Pointers on Production Cost-Cutting

with Bakelite Plastics Materials



The Lionel Corporation writes: "Our production cost for a whistle impeller was reduced 83% by employing Bakelite Plastics in place of metals previously used."

WHEN a single factor in production can bring cost-reductions for the makers of such varied products as those pictured here . . . it may offer vital savings in your plant, too!

Here are five significant "pointers" . . . typical experiences taken from the hundreds in our files . . . that show how consistently the use of Bakelite plastics cuts costs in production while stepping-up the quality of the finished product.

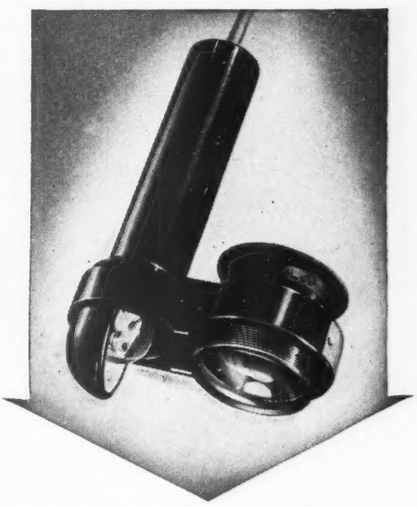
Profit from these actual experiences of other manufacturers . . . apply Bakelite plastics to your designs to produce *better* products at lower cost. Write for Portfolio 16 of illustrated booklets describing many of the more-than 2000 Bakelite materials now available.

Bakelite Corporation, 247 Park Ave., N.Y. *Chicago:* 43 East Ohio St. *Bakelite Corporation of Canada, Ltd.*, 163 Dufferin St., Toronto *West Coast:* Electrical Specialty Co., Inc., San Francisco, Los Angeles and Seattle

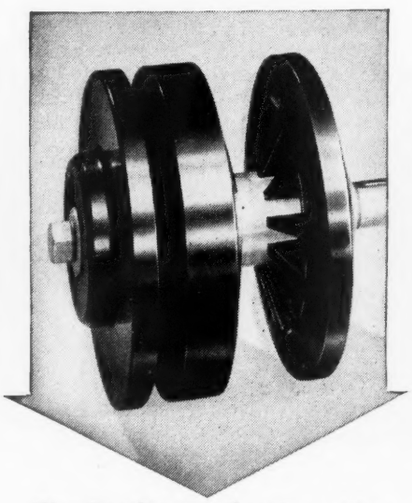
BAKELITE

The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" is the number of present and future uses of Bakelite Corporation's products.

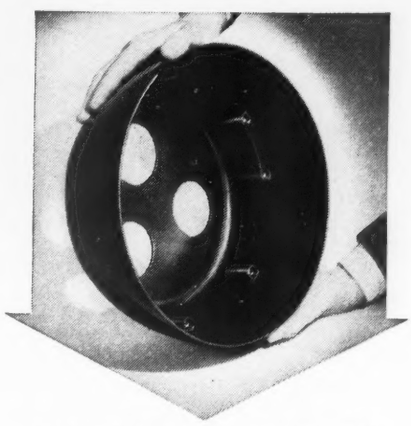
Plastics Headquarters



E. W. Pike & Company saved 75% in production costs and *doubled* their sales of Pike-O-Scope Magnifiers by forming the handle, frame and reflector from Bakelite Molded.



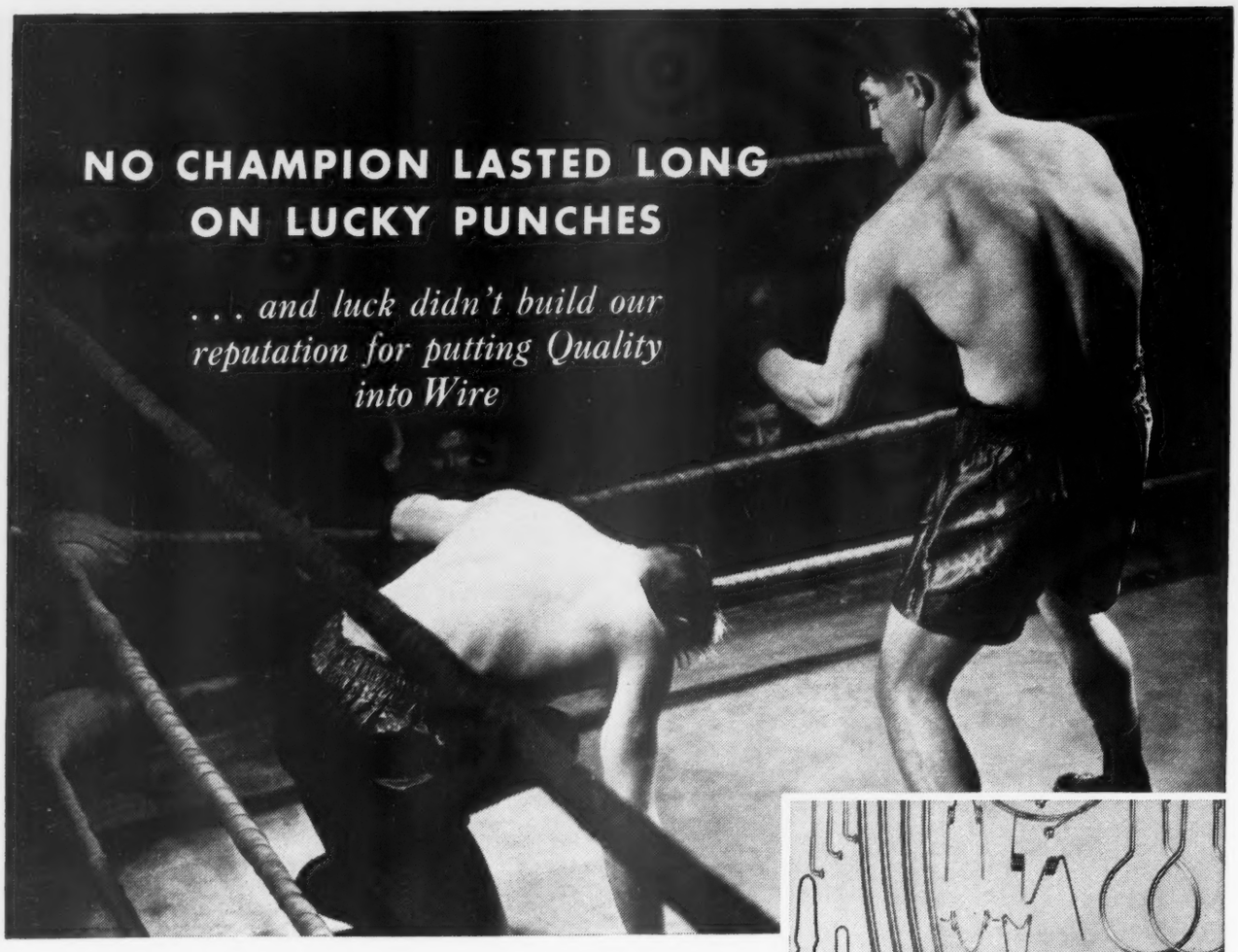
The Speedmaster Company states: "Bakelite Molded in our variable speed pulley eliminates machining operations . . . affords production economies that reduce prices below competitors'. Originally developed as Continental Machines Inc. equipment, the pulley met such wide demand that The Speedmaster Company was specially organized to market it."

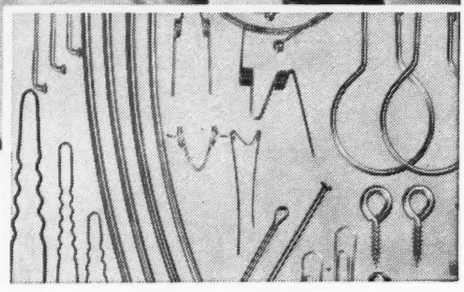


W. G. Shelton Company says: "The use of Bakelite materials for housings of our new Permanent Wave Machine cut production costs so much that other important improvements could be made without advance in price."

American Cystoscope Makers, Inc. report revolutionary advantages from use of Bakelite Molded in re-designing housings for Wappler Cautery Scalpels. New compact design was made possible at greatly reduced manufacturing costs. The lowered sales price broadened its market. Sales jumped 1400% in 12 months.

Visit Bakelite Booths No. 17 & 18 at the 1939 Chemical Show, Dec. 4th to 9th, Grand Central Palace, New York





Premier Spring Wire · Weaving Wire · Pin Wire · Bolt, Rivet and Screw Wire · Broom and Brush Wire · Pinion Wire · Basic and Bessemer Screw Stock · Premier Tested Welding Wire · Flat Nut Stock · Hair Pin Wire · Mattress Wire · Music Spring Wire · Piano Wire · Amercut Cold Finished Steel Bars · Pump Rod Bars · Wool Wire · Wire Rods · Also U·S·S Stainless and Heat-Resisting Wires.

OUR reputation for putting quality into wire is built upon over 100 years of wire-making experience. In that time American Quality Wire has proved its ability to meet the highest quality standards wherever it is used. American Quality Wire is checked at every stage of its manufacture to assure the uniformity that helps to give trouble-free production.

The experience we have had in more than a century of wire making is of value to our customers because our metallurgists are able to work out the most difficult wire problems using past achievements as a background. Our skilled craftsmen are capable of producing uniform wire in any quantity to meet your most unusual requirements.

If you have a problem involving wire, why not call upon our sales department to help you work it out? The strategic location of our plants will be of further assistance to you because deliveries can be made to meet your schedule of production.

AMERICAN STEEL & WIRE COMPANY

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Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Employee Relations and Safety

in the cost-reducing program

THE PLANT that does a good employee relations job invariably benefits from the results in increased production, better quality of product, lower labor turnover, less industrial strife. All these add up to lower production costs, lower prices, more goods sold, more jobs, more profits.

Today's job of employee relations is not to be confused with the welfare work of an earlier generation. Now, as then, the job of employee relations is primarily a matter of maintaining a contented and effective organization. The companies that are getting the best results are using the tried and tested tool of man-to-man relationship. But they are using also some of the newer tools: Reports to employees; surveys of employee opinion; open houses; hobby shows; vacations with pay; scientific employee selection and training; employee participation in work planning; job evaluation and employee rating; grievance procedures that get quick results.

Ranking higher than ever among the employee relations tools is safety. No plant that is not safe can maintain high employee morale. Every unsafe plant incurs unnecessary product costs.

WHAT TO DO

SUGGESTIONS THAT POINT THE WAY

Are we properly set up to do a good job of employee relations?

Does final responsibility rest in one executive who knows employee relations work and understands men?

Have responsibilities and lines of authority of all management personnel been defined?

Have we done all we should in the way of defining company policies regarding wages, promotions, layoffs, vacations, sick relief, safety, profit sharing, collective bargaining? Have we made these policies known to all employees?

Wherein do we need to strengthen those influences within the organization that increase the efficiency of the working force, resulting in lower production costs, improvement in quality of product, and better service to customers?

Are we providing safe and sanitary working conditions? Are we making suitable provision for rest, mealtimes, and recreation?

Does our plant have proper ventilation, heating, cooling, lighting, noise elimination?

Are we doing all we can to train and educate both men and women to become better employees and better citizens?

HOW Eye-Protection SAVED $45,000

. . . for a well-known metal-working company

In 1929, an eye-injury bill of $51,000 was run up by 41,500 employees of a certain metal-working company. Then American Optical Goggles were put between flying chips and endangered eyes. And in 1936, eye injuries cost only $5,800 . . . for 43,500 employees (2,000 more than 7 years before). So the saving was actually greater than $45,000 . . . and has increased in proportion ever since.

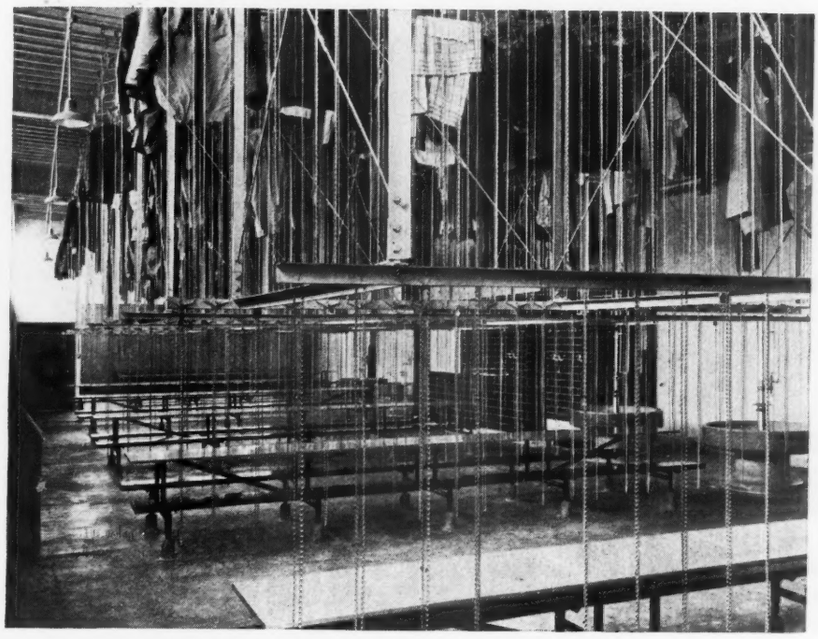
This is not an exceptional case. Plants in every line of industry have comparable experiences on record. And there may be a similar experience in store for *you* . . . if your costs and profits are prey at present to preventable eye injuries. You will be interested to learn, from an American Optical Industrial Representative, how easy and inexpensive it is to cover your plant *completely* with Planned Eye-Protection. Write the nearest American Optical office today for full information on how to reduce your eye-injury costs. No obligation of any kind.

American Optical Company

SOUTHBRIDGE, MASSACHUSETTS

MANUFACTURERS, FOR MORE THAN 100 YEARS, OF PRODUCTS TO AID AND PROTECT VISION

So the Men Go Home Clean



Basket-hanger units keep employees' clothes safe, also give them a good airing

Employees' comfort has been given every consideration in planning locker and washrooms at International Harvester Company's Truck Engine Works, Indianapolis. The manufacturing building alone is equipped with six combination rooms with adjoining toilet rooms. All are located penthouse-fashion above the bottom chord of the ceiling trusses. There are three on each side of the building, spaced equidistant from the ends of the building and from one another. Heat is thermostatically controlled, so that the rooms are always warm enough.

Each locker-wash-room contains 504 galvanized wire-mesh clothes baskets with two coat hangers attached to each basket. Basket-hanger units are suspended in sections of four rows each from the ceiling by galvanized elevating and lowering chains. Except when clothes are being placed in the baskets and on hangers, they are padlocked in an elevated position out of reach from the floor.

Midway along one wall in each room, and flanked by four washfountains, is a black tile booth inclosing a battery of shower baths. These fountains and baths make it possible for employees to leave the plant looking neat and clean.

Long metal tables with attached benches are fixed to the floor to provide comfortable, sanitary accommodations while employees are changing clothes or eating their lunches.

Each Foreman Runs His Own Plant

Foremen in one metal-working plant were a bit extravagant in ordering excessive quantities of indirect materials, such as grinding wheels. Someone suggested to management that by placing increased responsibility on

✦

Sky's the limit in a suggestion plan which pays half the savings the first year. A press operator recently got a check for $300.

these foremen they might gain a better sense of values and consider their orders more carefully before putting them through.

Invoices for the material they had ordered were handed to the foremen, and they were asked to okay them. This action instilled in the foremen an appreciation of the value of the materials for which they were asking.

The plan went further than this and tried to make each foreman feel that he was running his own little business. He was capitalized with so many dollars' worth of equipment, so much rental area, so much power and light. To this he must add tools and supplies, and man his department. He must run his "plant" on a paying basis.

Results of this plan included a greater appreciation of personal responsibility, cooperation between departments, and a closer check on quality in each department.

Booklet Brings Members to Credit Union

One credit union—with some 600 members out of a possible 900—has invested a very small part of its 1939 profits in a little 12-page booklet (about 4 by 5 inches) containing "answers to your questions."

Copies were sent to all current members, and a copy goes to each new employee on the day he or she comes to work. The purpose, of course, is to refresh old members on the reasons for a credit union, and to let new employees in on its benefits.

This credit union, by the way, has made 1,635 loans, totaling $153,699 in the 3½ years that have elapsed since its organization. Deposits as of October 1, 1939, were $38,250; losses from bad debts, $48.75; dividends, paid each year at the rate of 4½ per cent.

The first two months after the booklet went out, the number of new members jumped from an average of 12 per month to 18. The increase can be attributed to the booklet.

Saved $4,000,000 in 2 Years

In 166 steel mills employing 109,777 people, 2,397 eyes were saved over a 2-year period, with a direct saving to the companies of more than $4,000,000. This saving was based on the number of goggle lenses cracked by flying fragments and turned in by employees. Figures do not include the many eyes saved by lenses that were not fractured.

Information for Workers

To help employees understand their duties and privileges, many concerns distribute small booklets in which important items of employee information are set down in black and white.

The table of contents of one such booklet covers hours, time clocks, overtime, pay day, tool checks, lockers, vacation and service allowances, apprenticeship, lost and found, absence,

hospital, workmen's compensation, restaurant, automobiles, work clothes, savings, employee associations, jury duty and appearance as a witness, national guard or naval reserve, leave of absence, pay on termination of employment, safety.

Plant layout and organization charts are also included.

Re-Trained 300 Men for Other Trades

When technological advances reached into one industry and dictated a change from wood to metal fabrication, one concern faced the problem of discharging 300 woodworkers. Rather than do this it undertook a program of vocational rehabilitation. Every woodworker was given the opportunity to learn a new trade.

Naturally, this undertaking cost the company money—about $50 a man it estimated—but inasmuch as the types of trades that were needed were scarce in that city, the company also estimates that it would have cost as much to hire new men with some measure of the skills needed and train them.

Where the company really did gain was in increased loyalty and improved morale among all employees, both those who were directly affected and those who were not but who had an opportunity in this crisis to see the attitude of management towards its employees.

✦

"Pick your own hours," said one plant manager to his heat-treaters. Now, in summer, this hot job is done at night or early in the morning.

Graduates Pay-Off for Suggestions

One company with a flourishing suggestion system pays off on a schedule that might well be adopted by other concerns. It classifies suggestions and awards as follows: *A*, no limit and no maximum set; *B*, one-half the saving for 3 months—maximum award, $250; *C*, one-half the saving for 2 months—maximum, $150; *D*, one-half the saving for 1 month—maximum, $50; *E*, small cash award for suggestions that show no savings, but have other advantages.

THEY HAVE MUSIC WITH THEIR MEALS

Daily lunch-hour programs over the loud-speaker system at Borg & Beck Division of Borg-Warner Corporation, Clearing Industrial District, Chicago, consist of phonograph recordings, radio broadcasts, current sports and news information. Twice a month special programs bring plays and music, talent being drawn from shop and office. "Specials" are repeated at 8 p.m. for the benefit of the night shift. The announcing system includes a radio receiver, microphone, power amplifier, and fifteen dynamic horn-type amplifiers

She looks through the plastic mask and knows her eyes are safe from shattered needles or button fragments

*Mask Stops Eye Injuries

Invaluable equipment for certain types of machines—button and snap sewers and bar tackers—whose operation is made hazardous by shattered needles and flying fragments of buttons or snaps—is the protective mask shown in the photograph.

Its visor is made of light-weight, highly transparent plastic, and may be pushed back on hinges when not in use. A felt-lined leather headband attached to an adjustable rubber strap holds the mask in comfortable position.

Besides eliminating costly and painful eye injuries, use of this mask has made possible greater productivity and accuracy, because it has eliminated anticipatory flinching on the operator's part.—*Harold M. Scherr*, Plant Foreman, The Juvenile Manufacturing Company, Inc., San Antonio.

Community Play Fields

Recreational facilities for employees that may be beyond the means of one plant may be practical on a community basis, several plants contributing to the cost. At least one community has resorted to this cooperation in order to provide athletic fields and swimming pools for employees to use during their leisure hours.

Employees have also been encouraged to make flower and vegetable gardens on ground provided by the companies. Necessary plowing is done without charge, and prizes are offered for the best results.

Ten bridge tables (made by the company) were given away as door prizes at this unusually successful open house party

Door Prizes at Open House

On Monday, August 28, Lyon Metal Products, Incorporated, Aurora, Ill., held open house for the families of the 500 men who work in its plant.

Two weeks prior to the open house, "The Lyon News," a paper going once a month to the family of every employee, carried a story of the impending event. About a week later, a personal letter was sent to the home of every employee, reminding him of the affair and urging him to bring the entire family. Posters on the plant bulletin boards were also used.

A check on the number of people who came was made possible through the simple and popular device of giving away ten bridge tables (made by Lyon) as door prizes. Over 1,500 registered for the prizes, and several hundred more couldn't wait; they wanted to get going in the plant.

Hours were from 1 to 3:30 p.m. The shop did not work, but a few machines were kept going in each department to give people a better idea of the work being done. In addition, the men were told that there would be work at their machines, the idea being that they could start their own machines if they wanted to, and show their families how they operated.

The open house began with a tour through a display of finished products. Guides were stationed in this room to make people feel at home, but they quickly found out that it wasn't necessary to tell the visitors how the products were made. The factory employee who was taking his family through wanted to do that personally.

There were no formally conducted tours through the plant. Employees took their families through at their leisure.

✦

Rubber company has each man whose suggestion is accepted call at the manager's office for his check. Gives the management a chance to talk to the men who are on the alert.

✦

Everyone Knows Everyone Else's Job

In a packaging department where the work is intermittent—one product is packaged today, something entirely different tomorrow—the packing squads are shifted each week so that the force will be flexible. This flexibility makes possible quick changes of employees from operation to operation. Everyone in the department is on the flying squadron, so to speak.

Not only is each operator assigned eventually to every task, but different combinations of operations are constantly arranged so that the entire department is one big team.

This flexibility goes a long way to keeping the employees interested and happy. They like the diversity of jobs, and the constant change from job to job makes the least desirable tasks easier to take, because everyone knows that in a day or two assignments will be changed.

In this department 29 people are employed. If each person knew only his or her own job, 40 people would be needed.

Jobs for Oldsters

A rehabilitation department, where men recovering from injuries and men grown old in the company's service can be employed at useful tasks, is not only an asset from its humanitarian and good-will building aspects, but also can perform useful tasks. That's one company's experience at any rate.

Jobs that can be performed by a man too far along in years have been

taken out of the regular manufacturing departments and handed over to the 70-year-old foreman of this rehabilitation department. He distributes the jobs among his crew of oldsters and disabled operators. The jobs are not boondoggling in character, for each one would be performed out in the plant if it weren't provided for here.

The men in this rehabilitation department are happy in the knowledge that they are useful, that they can still play a part in the output of this plant. Their presence is a morale builder for the younger men out on the production line, for they are glad to see the old-timers stay around; they realize that the company will probably provide work for them when they slow down.

Must Have Permit to Run Hazardous Equipment

It's all well and good to shout safety from the housetops—a lot of good is done that way. But considerably more good can be accomplished if measures of safety control can be devised.

One good instance of this is to be found in a plant that will not let men work in certain hazardous occupations until they have passed prescribed tests and received permits signed by foremen and countersigned by the safety engineer.

Crane and elevator operation, sawing, and welding are some of the jobs coming under these restrictions. Safety rules for these tasks have been formulated and printed in small booklets. After the man has been trained by a foreman for a specific task, he is examined on his knowledge of these safety rules. If the foreman is satisfied that he can work safely, he signs the permit at the back of the rule book. After the permit has been countersigned by the safety engineer, the man has qualified for the job, but he must keep his permit on his person at all times to show that he has passed the test.

Safety Bulletin Boards Help Save $6,000

Safety bulletin boards at Alabama Fuel & Iron Company, Birmingham, are so constructed that the responsibility for an injury is placed on the foreman as well as the individual by the use of red lights opposite the names of the foreman and the man who is injured.

When an entire division is free of injuries, the board carries white lights.

The company, by making everyone think in terms of safety, cut injuries in one of its operations, for example, from 113 injuries in 1936 to 28 in 1938. Monetary savings for 1938 over 1937 amounted to a little less than $6,000.

Dispels Characteristic Locker-Room Odor

Secret of the sweet, clean smell in the locker room at Malleable Iron Castings Company, Branford, Conn., is its simple, yet effective ventilating system.

Lockers are the largest standard size, set 32 in a double row on a 6-in. cement curb. Doors and bottoms are perforated, and the space between lockers and floor is connected to an underground duct of vitrified pipe which runs lengthwise of the room and is in turn connected to an exhaust fan.

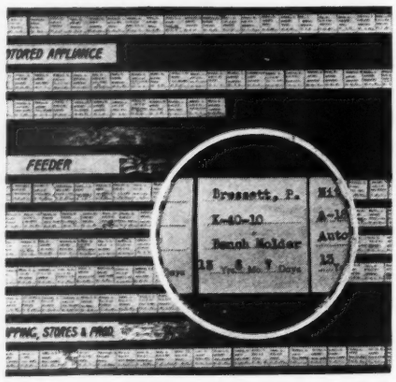
The latter has a timer which permits it to be operated as much of the time as may be necessary to provide plenty of ventilation.

The underground duct is pitched so that any accumulation of dirt may be washed into a drain out in the yard.

Puts Lay-Off "Cards" on the Table

Possibly one of the most difficult problems of the foreman over the last couple of years has been the matter of layoff and seniority.

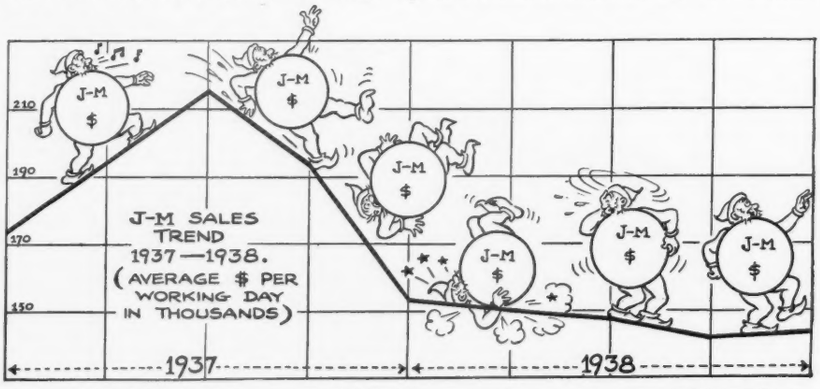
A simple device that has aided greatly in these matters is shown in the photograph. We have heard a lot of late about "laying the cards on the table." Here is one instrument that makes that a reality. On this board is the name, occupation, and service of each man within the division. When a man is to be laid off, the foreman and representative can see the problem clearly and discuss it freely.



Close-up of section of "lay-off board"

The benefits that we have derived from the use of this board are: First, a better understanding of the problem; second, no one, either the representative or the foreman, can hide any factor that might bring the complaint of favoritism on either side. It gives an opportunity for quick review of all men of lesser service and the occupations of those men so that all factors can be considered beforehand and everyone will have an understanding of the situation. This has been a time saver in many ways. It avoids grievances. It is open and clear in every way.—*T. O. Armstrong*, Supervisor, Industrial Relations, Westinghouse Electric & Manufacturing Company, Springfield, Mass.

WHAT HAPPENED TO THE J-M SALES DOLLAR IN 1938



Johns-Manville's 1938 report to jobholders struck a new note in humanizing and simplifying corporate statements. A humorous gnome-like figure symbolic of the sales dollar frolics through the report, telling the story of the company's business in arresting fashion. The sales trend illustrated here shows, for example, that the sales dollar had a rough time of it compared with early 1937

*No Graveyard Shift, Costs Down a Third

For a number of years it was found necessary to operate a certain department of our plant on three 8-hour shifts per day. One operator was needed in each shift, the men trading shifts each week.

Operating on this schedule, we found that our labor costs were somewhat higher than we could justify. We had repeatedly discussed with the plant foreman methods of eliminating the third or graveyard shift. The foreman held to the contention that the shift was absolutely necessary to the efficient operation of the plant.

Still not convinced, we sat down and analyzed the entire set-up. Knowing that our men disliked working the graveyard shift, we approached each one with the following inducement:

"If we could work out some method of eliminating the third shift, it would not be necessary for any of you to work the long lonesome hours of the early morning from midnight to 8 a.m. The third man would be given work elsewhere in the plant, and your department would turn out the work in 16 hours with two men."

The thought of not having to work graveyard seemed to effect a miraculous change in attitude. We have been operating the last three months with a two-shift schedule. The boys get the work out in an efficient manner, avoid graveyard shifts, and the operation shows a one-third decrease in labor cost.—*J. G. Deming*, Superintendent, Albers Brothers Milling Company, Los Angeles.

A President Reports to Employees

Many new names were added in 1939 to the long list of companies that are profiting from the use of reports to employees.

Notable among such reports is the profusely illustrated, plastic-bound

**It's "Speed—and Safety"

A year or two ago, after the plant accident statistics for the previous year had revealed loss of ground, the writer decided that an additional appeal could be given to the slogan "Safety First." Why not, for instance, have "Speed—and Safety"?

This then became our new slogan, and the approach to prevention of accidents or near accidents became as follows: Each time an accident, a dangerous condition, or near accident was reported, through the mediums of superintendents and plant engineers, suggestion schemes, foremen's discussions, the plant engineer or chief tool designer asked himself the following question: "Can I combine speed with safety?"

The results have been encouraging; 60 per cent of the cases investigated have shown, after redesign or modification, an economy in manufacturing cost combined with a much higher degree of safety. The average increase in speed of manufacture has been 28 per cent.

Each case dealt with is photographed or sketched prior and subsequent to the change, and the photograph is filed in an album with a data sheet accompanying. Whenever an addition is made to the album, it is circulated among the technical staff, and every new technical staff member of the organization sees this album soon after starting.

It is gratifying that through this and other safety measures the accident frequency rate fell last year from 1.50 to 0.99 and this year to date it is standing at 0.69. At this rate the album may take longer to fill, but so much the better—we are cost cutting in other directions.—*W. Puckey*, Works Manager, Hoover Limited, Perivale, Middlesex, England.

SPEED-AND SAFETY
THE OLD WAY
An operator had the end of one finger cut off on this tool owing to the inability of the guard to pull the hand away from the danger zone before the punch descended
THE REVISED WAY
Perfectly safe, with hands kept well away from the danger zone, and quite independent of any moveable guard setting.
Not only safer but faster.
The re-designed tool enabled a 17% increase in output to be achieved

Not only does this British concern make up the safety album described in the text; it also uses displays like this one to put across its new safety slogan

TEMPERATURE
ERE AGAIN. OUR SHOP IS FUL
DIVISION JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC TOTAL
AIR CONDITIONING 1 1
FEEDERS 1 1
MOTORED APPLIANCE
MAINTENANCE
COMMERCIAL REFRIGERATION
DOMESTIC REFRIGERATION 1 1 2
PRODUCTION 1 1
OFFICE
PLANT TOTAL 1 1 1 2 0 5
ACCIDENTS THAT CAUSED LOST TIME TO EMPLOYEES

Clock, thermometer, and moving slogans draw attention to this safety bulletin

booklet issued by Clark Equipment Company, Buchanan, Mich. It pictures its plants in four Michigan cities, shows products, processes, people.

It then takes the financial statement and reduces each item to a figure per employee, shows what it received from customers per employee, where it all went, how much was left as profit.

Another table shows that of the Clark 1938 dollar 41¢ went for material, 34¢ for wages, 11¢ for repairs and depreciation, 7¢ for taxes, insurance, and development, 3½¢ for electricity and fuel, leaving 3½¢ for profit.

Stops Eye Injuries and Saves $15,000

In 1929 a company in the metal-working industry employed 41,500 people, and its bill for eye accidents in that year alone was $51,000—more than $1 per employee. The safety director saw what could be done, presented his figures to the management, and received the latter's support for the inauguration of an eye protection program.

In 1936 the company employed 43,500 people, or 2,000 more than in 1929. But its bill for eye injuries was only $5,800—quite a drop.

Assuming that the company paid $30,000 for eye protection equipment, it is still $15,000 ahead of the 1929 figure.

**Puts Safety Slogans on a Moving Belt

Some one has said that safety is an old story, and it is. It is an old package that has to be redressed in order to keep it alive, and new devices and methods have to be thought out to keep interest in this old story alive.

To those people who live in and around New York City, the Chrysler Building is an old story. People walk by it and never notice it. You cannot walk through Times Square, however, without raising your head to look at the news of the day as it flashes across the Times Building.

We decided to use this idea to draw the interest of our employees to the safety record of which they are a part. We have a safety bulletin board incorporating three features that are sure to draw attention to the board. First, a clock—everybody is interested in whether he gets in on time; second, a thermometer—everybody is interested in knowing just how hot or cold it is; third, a moving belt on which are inscribed various slogans contributed by the employees. With each slogan the name of the author is given, and each week new slogans are inserted. These slogans are moved across the board by the moving belt. Everybody is interested in seeing what the new slogans are going to be, and who contributed them. This has proved a most attractive board and a most interesting one from the standpoint of the employee.—*T. O. Armstrong*, Supervisor, Industrial Relations, Westinghouse Electric & Mfg. Co., Springfield, Mass.

*Time Out for Smokes

A hosiery knitting room employed twelve male knitters, each running from 20 to 30 machines, working 11 hours per night. One machine fixer also acted as foreman. While taking time studies for setting standard rates in this department, the time-study engineer noticed the periodic disappearance of certain knitters from their machines. During their absence the machines were left running. Any knitting-room employee knows the result of this—defective hose. The loss to the company for such hose is usually about 30 per cent.

Investigation showed that the absence from the machine was for a smoke. The engineer thereupon recommended to the management a complete shutdown of machines for a 15-min. period after the third and eighth hours, so that each man could retire to a rest room outside for a smoke (the lunch hour came after the sixth hour). These smoke periods are paid for at the regular base rates.

The results have greatly helped in reducing defective hose, with a saving to the firm. Any man now found stealing time for a smoke is censured by his fellow workmen for fear of losing a welcome privilege.—*Arthur Bradshaw*, Time-Study Engineer, York Knitting Mills, Ltd., Woodstock, Ont., Canada.

Aired Their Grievances

Many industrial relations problems could be easily and quickly solved if management only could know what was on employees' minds. To find out, and establish in employees' confidence in management's sympathetic interest, one company issued a booklet of questions, distributed them to everyone from the president down, asked all to answer

✦

A metal-working plant used to require goggles only on obviously hazardous jobs. Average cost of eye injuries, $1,668 a year. When goggles were made compulsory on all jobs, yearly cost dropped to $88.

Procter & Gamble reports loss of office employees' services from colds, etc., was cut from 2.2 to 1.6 days per worker during first year of air conditioning —27 per cent.

✦

the questions and get off their chests any grievance they might be harboring.

That employees were more than glad to receive such an opportunity was shown by the fact that few "crabbing" replies were turned in, and many employees signed their names although they were not required to do so. Lack of understanding of phases of the company's personnel program was evident from the replies, and the company had something to go to work on.

Safety from the Start

A company that recognizes the importance of getting new employees started right, so that they will always be safe workers, has outlined the steps it will take in inculcating safety in each new employee:

1. The significance of the plant's safety program is explained.

2. He is introduced to the foreman who attempts to put him at his ease.

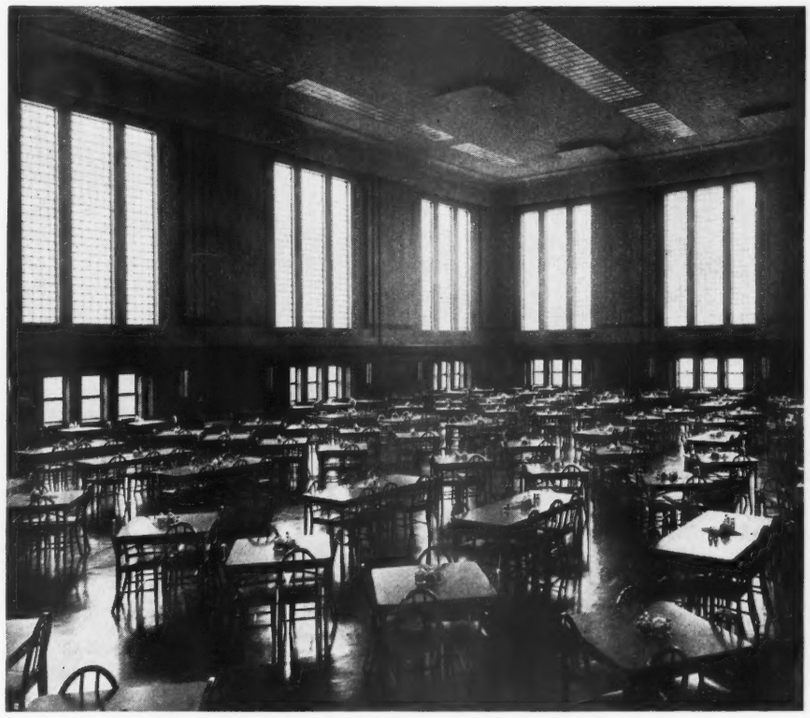
3. Foreman assigns him to old and experienced employee with whom he works for one or two weeks, becoming accustomed to the routine and shop noises and learning about machine he is to operate.

4. He is put on the simplest machine with full instructions on how to operate it and what to do in case something goes wrong.

5. Several times a day he is checked up to see how he is handling the machine and how well he is following the routine taught him.

6. He attends general safety meetings of the entire plant twice a month.

7. A suggestion box is maintained in which he can place safety ideas that he thinks up.



WHO WOULDN'T LIKE TO EAT HERE?

Long recognized as one of industry's best human relations tools, the company cafeteria has indeed come a long way. Good example of progress made in this phase of industrial plant management is the cafeteria at Eli Lilly & Company, Indianapolis, which is a tangible expression of that concern's belief that bright, cheerful surroundings are almost as important as good food. This cafeteria covers 6,000 square feet, seats 400 people. Glass block panels reach almost to the 35-ft. ceiling, let in abundant light, well-diffused throughout the room. Also, the insulating properties of the glass blocks make for efficient operation of the air-conditioning system. Natural daylighting is supplemented by indirect lighting units concealed behind glass block panels in the ceiling

**They Learn 3 or 4 Jobs

A substantial contribution to cost cutting has been developed through our program of employee flexibility, inaugurated more than three years ago in one of our departments.

This department is divided into nine major divisions, each of which requires both skilled and partially skilled employees. Up to three years ago the majority of these employees were trained exclusively for a single operation or machine.

The nature of the printing business does not permit stability of man-hours in any one division, something that is more easily attained in plants that manufacture stock items. Practically every printing order is a job order, only a small percentage of such products being manufactured for stock.

The production departments are frequently confronted with a shortage of labor in one or more divisions while other divisions in the same department are working short time, this condition changing from one division to the other as the orders progress through the department. Delivery delays, increased production costs, repeated "headaches" for the production control manager, overtime in some divisions and short time in others, result.

An intensive employee training program was introduced to develop workers for two, three, or four operations, or machines, and it has progressed to the point where most employees of the department efficiently cover this range. The plan is now tending to include exchanges between departments.

The department now has practically no non-productive time, caused by irregular volume, charged against it. This was formerly a large item. Man-hours are estimated 24 hours ahead after the count of new orders and orders in process is made. Furthermore, no consideration is given to the capacity of each separate division of the department, but only to the department as a whole. We positively know that when correct estimates are made of the potential man-hours required throughout the department for a definite number of orders, the flexibility of our personnel will make possible a

balanced operating schedule in all divisions of the department.

Another factor, which possibly isn't evident now in the cash drawer, is the noticeable improvement in department morale resulting from more equality in man-hours. Each man knows that when his working hours are reduced on account of insufficient orders the working hours of practically all employees of the department are reduced accordingly.—*Walter G. Fremont,* Department Supervisor, The Standard Register Company, Dayton, Ohio.

Cuts Accident Costs 60%

Something different in accident prevention boards is one that does more than warn of danger, report occurrence of an accident, or show progress of a safety campaign. It provides for a description of each accident, its cost, its cause, name of man injured, his department, amount of time lost.

Probably the principal benefit of such a board is the part it plays in maintaining employee morale by putting at rest gossip and rumors that may arise around an accident. By presenting the particulars to all employees as soon as an accident has happened, employees are assured that nothing is being withheld.

At the top the board has two lights, one red and one green, mounted in correspondingly colored circles in which there are white crosses. The green light remains burning until a lost-time accident occurs. If more than seven days are to be lost as the result of an accident, the red light is turned on and left on until the end of the month. Details of the accident are placed on the board in red chalk. If the employee is to be kept away from work less than seven days, the green light is left burning, and the details are written in green chalk.

Plant records show that accident costs have decreased 60 per cent.

Saves Hands from Acids

A battery manufacturer formerly supplied his employees with rubber gloves costing $2 a pair as protection against dangerous acids. Employees disliked gloves; they made their hands perspire.

Now the manufacturer supplies his men with a waterproof cream which is rubbed into the hands or other exposed skin surfaces. The cream is quickly absorbed, drying into an invisible, protective, yet flexible film. Employees like this new method much better.

Good Posture Is Good Medicine

Posture research, carried on by one company to determine what features posture chairs should incorporate, has brought out the following points:

1. Workers sitting in a slouched position may rob themselves of as much as 24,000 cubic inches of air in an 8-hour day, due to the cramped condition of the chest with consequent restriction of breathing.

2. Improper posture frequently causes fatigue. This is due to restriction of muscular freedom; accumulation of fatigue substances in the muscles as well as in the circulatory system, and the effect of these substances upon the brain, producing inertia, gaping, fatigue, and general mental apathy.

3. In various special tasks requiring an unusual amount of concentration and skill, proper posture was found to contribute to efficiency, and to reduction of accidents and time losses. A really marked improvement in attendance has also been noted.

These findings indicate that proper posture is preventive medicine

✦

By the simple expedient of assigning numbered spaces in its parking lot to employees who drive to work, one company silenced the squawks, prevented confusion, economized space.

This Club Thinks Up Cost-Cutting Ideas

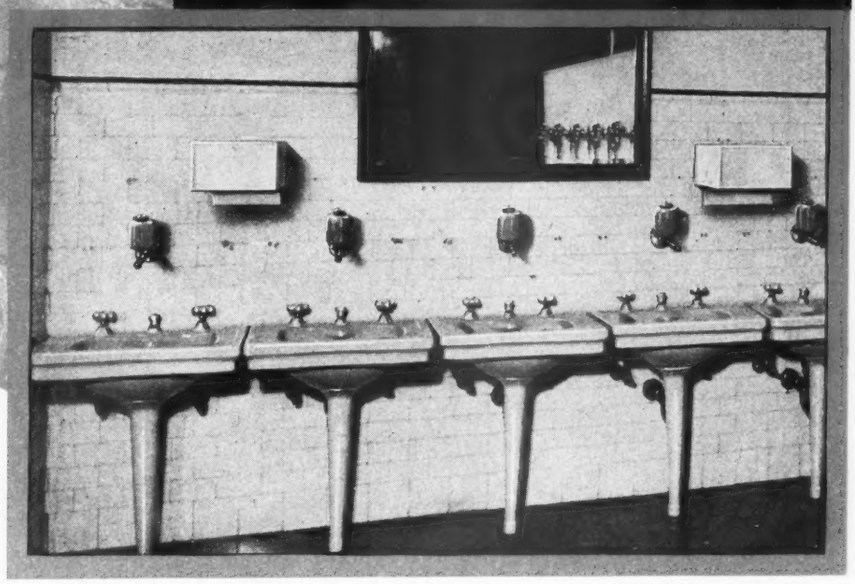
Many companies have suggestion systems designed to encourage employees to think about their jobs and their company, and share with management any ideas or criticisms they may hit on. Not content with just providing the avenue by which these ideas can be conveyed to management, one company hit upon a stimulus to this type of thinking by establishing a "Concentrating Club." Any employee who would promise to put in one hour a week outside of working hours, concentrating on how he or the company could do a better job, was eligible for membership.

Once when a wage cut was imminent, members of the Concentrating Club were told that the cut could be avoided if costs were cut by reducing idle time and stopping waste. The men thought fast and came across with enough ideas to make the necessary savings.

HINGED HOOD GUARDS MAN, EXHAUSTS DUST

Dual safety purpose is served by the galvanized sheet metal hood on this sanding operation at International Business Machines Corporation, Endicott, N. Y. Not only does the hood prevent sandpaper belts from injuring the operator when they break; it also serves to collect the dust and exhaust it

Which Plant is YOURS?



One with washrooms, as above

...OR LIKE THIS

This Company, selling direct to industry, has both products and service to offer, by which you may well find it possible to better your plant washroom conditions AT A SAVING. We will be glad to send you the 72 page "Scope of Sanitation" so you may know more about West products.

To provide proper washroom sanitation in the modern plant, West Disinfecting Company supplies, through its nation-wide chain of direct-service offices, the essential supplies:

1. **West Paper Towels** made of fresh, clean pulp in a variety of compositions in order to more exactly fulfill any special requirement. For economy . . . For Shop and Office Health Protection . . . For Employee Contentment.
2. **West Liquid Soaps and Soap Dispensers** — made to industry's various requirements and designed to provide sufficiency and efficiency, without waste. Individual Unit Dispensers or Supply for a battery of basins from an elevated tank (West Soaparatus System). For maximum economy, we suggest pre-lathered soap by means of our Latherator dispensing valves.
3. **West "United" Waste (Used Towel) Receptacles.**
4. **West Coin-operated Kotex Vending Cabinets.**
5. **West Automatic Drip Machines** for deodorizing toilets and urinals — and a range of deodorizing fluids.
6. **Coro-noleum,** the West cleansing disinfectant and deodorant for mopping, scrubbing and general sanitary cleaning.

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☐ Please send me a copy of your "Scope of Sanitation", which you offer without obligation.

☐ Please have your representative call.

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Company _____

Street & No. _____ City & State _____

ACCIDENTS JAM PRODUCTION JUST AS DIZZY RED LIGHTS WOULD JAM TRAFFIC

We can help you make work flow

Accidents — or even the mere ***threat*** of accidents — can disorder the flow of work into as big a muddle as needless and crazy red lights would upset highway traffic.

That is why the service provided by your Workmen's Compensation insurance company has a direct bearing upon your own job.

American Mutual safety consultants want safety measures to contribute to plant operating efficiency. By helping to work safety habits into methods and systems — as well as safeguarding physical hazards — they have made it possible to show measurable savings on cost sheets. Injuries have been reduced, production delays eliminated, and damage to machines and material prevented.

RESULT: *the first of 3 profit opportunities*

In addition to the smoother flow of production which results from safety, there is frequently a saving to be made through lower premium rates — sometimes 30% lower than the average of similar firms in the same state (see chart).

Meanwhile, two other profit opportunities are available to American Mutual policyholders:

- through specialized medical care directed toward rebuilding the job-holding ability of men who were injured.
- through regular policyholder dividends which have consistently saved 20% or more of insurance costs.

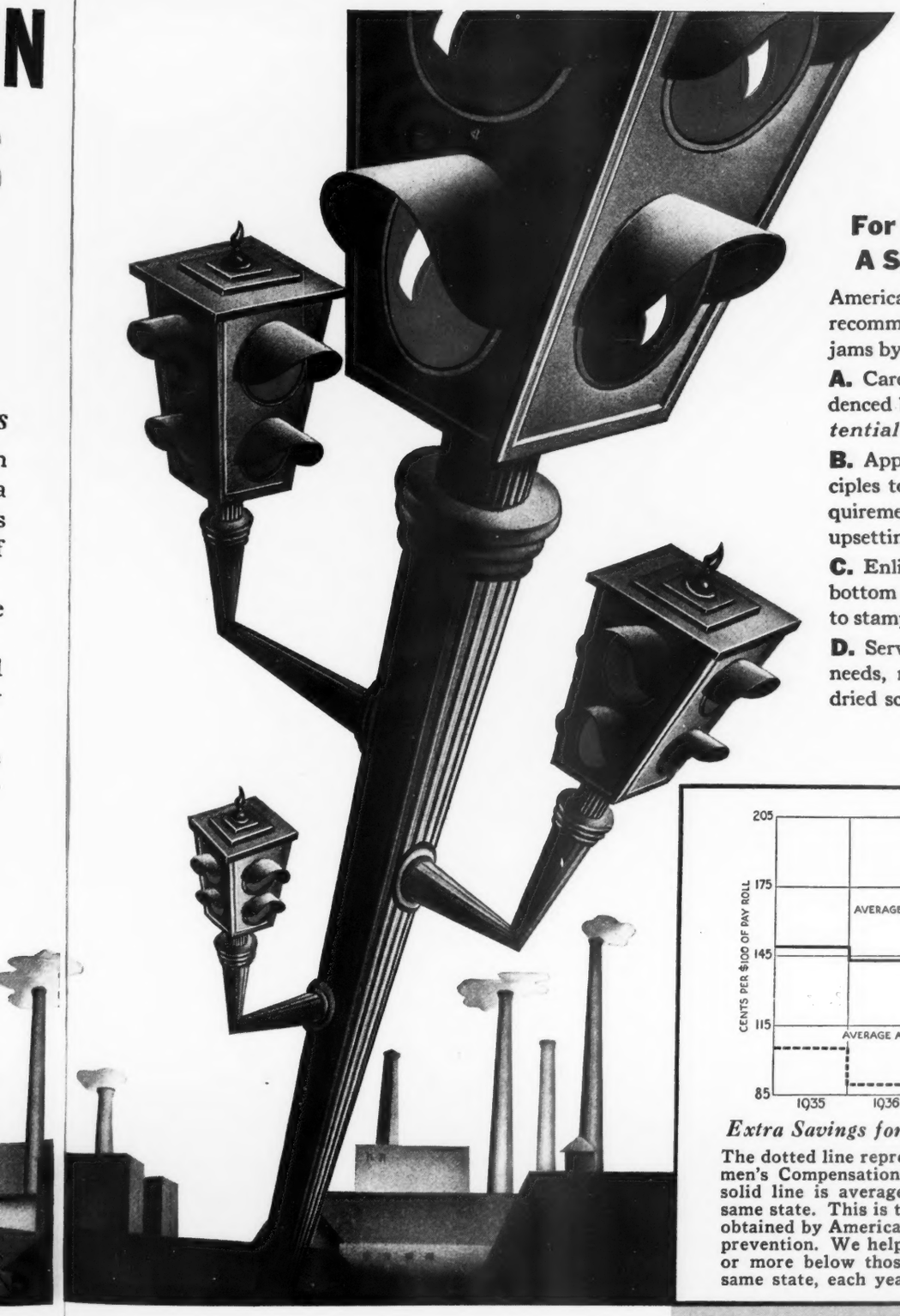
Learn more about the first American liability insurance company by sending the coupon for the free booklet, "Three P's of Safety".

1887

AMERICAN MUTUAL *WORKS*

American Mutual offers opportunity for savings on Automobile, Fidelity Bond, and practically all other lines of casualty insurance, in addition to Workmen's Compensation.

Branches in 59 of the Country's



For Each Policyholder: A Specific Safety Plan

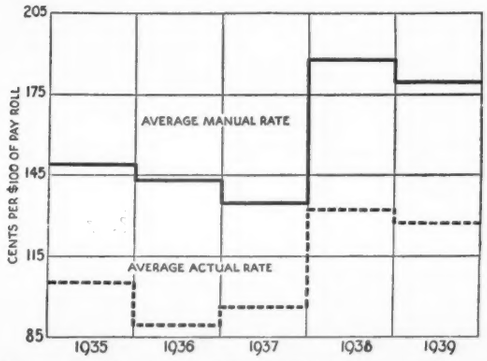
American Mutual safety consultants recommend eliminating accident jams by such methods as:

A. Careful study of hazards evidenced by past accidents and of *potential* accident causes.

B. Application of proven safety principles to the existing production requirements — without expensive or upsetting changes.

C. Enlisting of *all* employees — from bottom to top — in a conscious effort to stamp out accident causes.

D. Service gauged by the plant's needs, not according to a cut-and-dried schedule.



Extra Savings for Metal Products Company

The dotted line represents one policyholder's Workmen's Compensation insurance rate for $100 payroll; solid line is average rate for similar firms in the same state. This is typical of the results frequently obtained by American Mutual's methods of accident prevention. We helped this firm keep its rates 27% or more below those of similar companies in the same state, each year for the last 5 years.

TO MAKE ALL WORK SAFE

Admitted Assets: $38,330,807.44 Liabilities: $32,365,700.56
Surplus to policyholders: $5,965,106.88 As of Dec. 31, 1938

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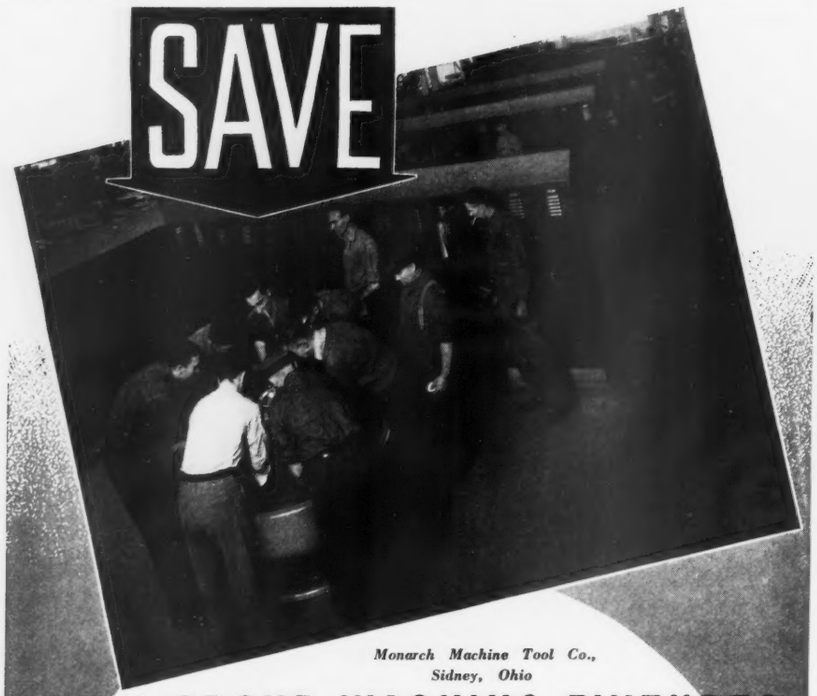


Monarch Machine Tool Co., Sidney, Ohio

WITH GROUP WASHING FIXTURES

Save Workers Time—Promote Cleanliness—Aid in Reducing Dermatoses—Keep Men on the Job —Save Space, Water, and Installation Expense

● As many as 10 men can wash *at one time* in the clean, running water—yet each Bradley requires no more piping connections than one *single* wash basin!—one hot water, one cold water and one drain connection. Installation and maintenance expenses are reduced —70% less water is consumed. . . . Without obligation, experienced washroom consultants can help you—suggest arrangements for new or existing buildings. Bradleys will pay for themselves out of *savings* —as pointed out in our Catalog 937. As a first step, let us mail you a copy. . . . BRADLEY WASHFOUNTAIN CO., 2215 W. Michigan St., Milwaukee, Wis.

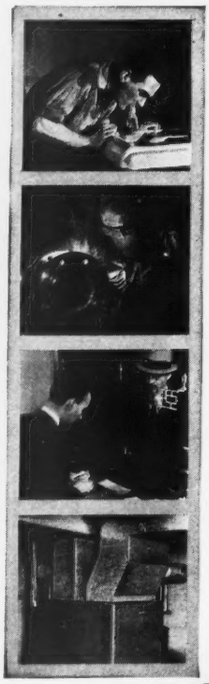
BRADLEY WASHFOUNTAINS

Plans and ideas for washrooms will be furnished by Bradley Washroom Consultants. Our free Catalog mailed also on request.

A FIVE-POINT PROGRAM

FOR *BETTER* INDUSTRIAL RELATIONS

Attention to the "little" wants and comforts of the people who work with you often creates more good will and loyalty than a more elaborate program. These five practical personal suggestions have been used successfully by progressive management to build good will. They can go a long way toward making your industrial relations more effective. Such things prompt men to say: "This is a good place to work!"



1 Cool, fresh drinking water from sanitary fountains or coolers revives and refreshes tired workers. It also helps prevent time lost through fatigue and illness.

2 Naturally, where danger exists, safety precautions are taken for granted. But, by checking *all* working conditions and new machines, you can increase the *comfort* and *safety* of your people.

3 Workers welcome and appreciate voluntary thrift plans, either through their own organizations or local savings institutions. Money put aside regularly is the easiest way to save.

4 Ample fan or air-conditioning units are used in progressive plants where fume or dust conditions make the worker's job difficult. Such consideration means more efficiency as well as good will.

5 Clean, attractive washrooms with hot water, soap and *individual* ScotTissue Towels remind workers *daily* of management's concern for their comfort, welfare, health.

HAVE YOUR WASHROOMS SURVEYED

The Scott Washroom Advisory Service is available to help arrange washrooms comfortably, economically and efficiently. This free service will suggest how to relieve congestion, reduce waste and overhead expense in plant and office washrooms, and help create good will. A Scott Washroom Survey will be made of your washrooms without obligation. Please write: Scott Paper Co., Chester, Pa.

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They're satisfied at wash-up time—ready for good work tomorrow

Convenient Crane Plumbing speaks to them more plainly than words

He needn't be told that management is friendly

THIS FREE BOOK HELPS YOU SOLVE SANITATION PROBLEMS

Don't miss the *Profit* viewpoint of adequate employee comforts

•A contented worker is a better producer—thus it follows that an investment in adequate employee comforts is a sound investment that brings worthwhile profits.

Modern, sanitary equipment is necessary to the comfort of workers. Handy drinking fountains that provide a safe and satisfying drink—up-to-date wash-up sinks . . . well-equipped toilet rooms—such conveniences result in a satisfaction that is reflected in the production line.

Crane Industrial Plumbing goes a long way in promoting better employee relations. Because its features provide more enjoyment to the user, Crane Plumbing clearly expresses managements' friendliness and interest in employee welfare.

From the value viewpoint, management, too, will enjoy satisfaction in Crane Plumbing. Designed for industrial use, it embodies enduring resistance to the hard usage of such service. It affords protection against high maintenance costs.

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Planning adequate sanitary facilities for industrial buildings is a big subject—one that is comprehensively treated in Crane's booklet, "Plumbing for Industrial and Commercial Buildings." Here is authoritative information on sanitation problems . . . how to solve them . . . what equipment to use . . . where and why. It explains the advantages of expert installation by a licensed master plumber.

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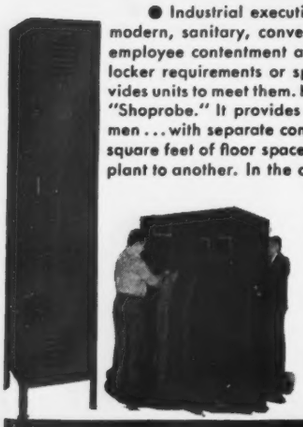
● Industrial executives everywhere are discovering that modern, sanitary, convenient locker facilities contribute to employee contentment and efficiency. No matter what your locker requirements or space limitations, The Lyon Line provides units to meet them. Note, for example, the Lyon patented "Shoprobe." It provides complete locker facilities for twenty men . . . with separate compartments for each man . . . in 12½ square feet of floor space. Easily moved from one part of the plant to another. In the city where the Lyon "Shoprobe" was first introduced, five large plants have adopted it as standard equipment for employee clothes storage. Write for full details on the "Shoprobe" and other industry-proved locker room units. **LYON METAL PRODUCTS, INCORPORATED, 1211 River Street, Aurora, Illinois.**



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For Safe, Convenient Clothes Storage

LYON STORAGE EQUIPMENT *Service*

Serve FOOD for efficiency

Ideal **FOOD CONVEYORS**
for periodic food distribution throughout your factory.

Model No. C-843 shown above (97" long, 44" wide, 60" high) has aluminum body and frame; copper refrigeration tank; heated compartment has stainless steel at all points that contact food. Many other models. Write for interesting booklet, "Human Beings at Work."

THE SWARTZBAUGH MFG. CO.

ESTABLISHED 1884 **TOLEDO, OHIO**

Distributors—The Colson Corp., Elyria, Ohio. Associate—The Colson Equipment & Supply Co., Los Angeles, San Francisco; The Canadian Fairbanks-Morse Co., Canada.

Fewer Layoffs

Despite the rule "REPORT ALL INJURIES," employees are apt to overlook minor nicks, cuts, and scratches. Bacteria readily lodges in such skin abrasions, often causing serious infection, dermatitis, and costly layoffs.

High in bacteria removal power, Formula SBS-II, the modern skin cleanser, replaces soap in plant washrooms, helps keep skin clean and free from infection. Cost: under 1¢ a week per worker. 2910 plants use it today. **Write now for generous Free Trial supply.**

FORMULA SBS-II

The WASHWORD of Industry

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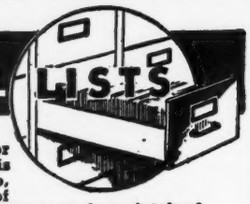

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DO *your* washrooms reflect respect or contempt for the comfort and health standards of the people who work with you? Dirty, crowded, poorly equipped washrooms breed ill will . . . run up hidden costs, too.

In contrast, today's *planned* washroom is adequate to handle rush-hour traffic. It is well lighted and ventilated. Provided with hot water, soap and plenty of sanitary ScotTissue Towels—such washrooms build good will every day . . . actually save you money.

FREE! "Scott Washroom Advisory Service" Booklet. We suggest you send for this interesting booklet of efficiency and cost-reducing facts already used to put thousands of washrooms on a satisfactory, economical basis.

• Scott Paper Co., Chester, Pa. Send me, without obligation, your booklet, "Scott Washroom Advisory Service."

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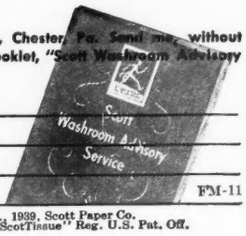

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Section 8 FACTORY'S Catalog Service

Employee Relations and Safety

FACTORY, through the cooperation of leading manufacturers, makes it possible for you to secure catalogs, bulletins, and booklets listed here without cost or obligation. Check and fill out the coupon below and send it to FACTORY. See other sections for additional catalog listings.

1 **"Don't Play With Fire"** — A new booklet on industrial fire fighting describes the way in which carbon dioxide, snow-and-gas smothers Class B and C fires, involving flammable liquids and electrical equipment, respectively. Tells about the various types of Lux equipment for the most common and dangerous industrial fires. Also describes handy portable type fire extinguishers. **Walter Kidde & Co.**

2 **Food Service Equipment** — New catalog and bulletin describe the "Ideal" food service conveyors for use in industrial plants. Supplies valuable information on how food served frequently in plants helps maintain energy and increase efficiency, reduce accidents and save lost time. All equipment is well illustrated and described completely. **The Swartzbaugh Mfg. Co.**

3 **Hand Cleaning**—Folder 109-JHK-24 describes new Han-Klen and Dispenser, a hand cleaning product that does a perfect job in removing grease, printer's ink and other chemicals which stubbornly defy removal by ordinary soaps and cleansers. Well illustrated. **Finnell Systems, Inc.**

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(Continued on page 302)

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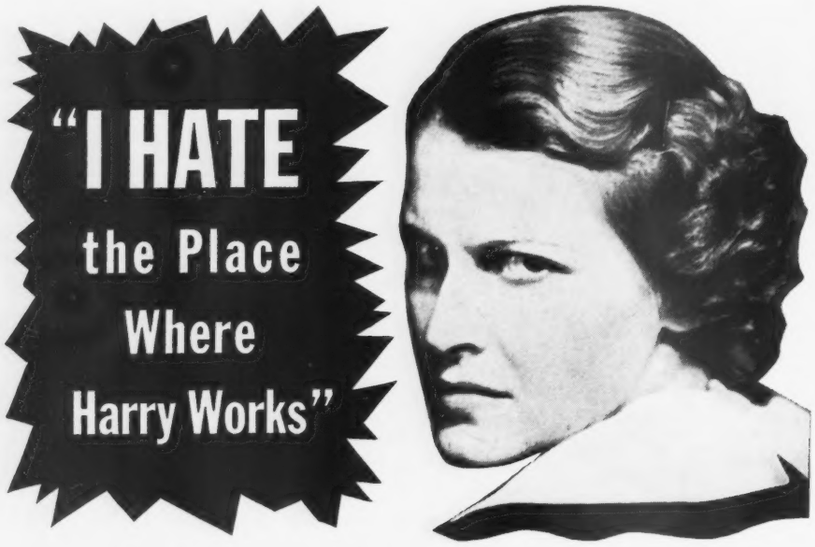

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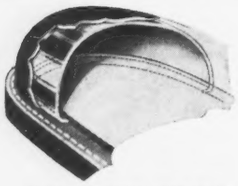

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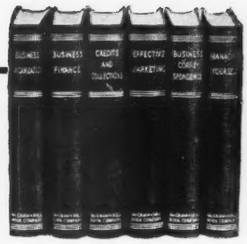

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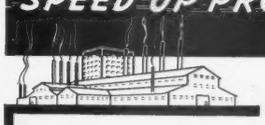

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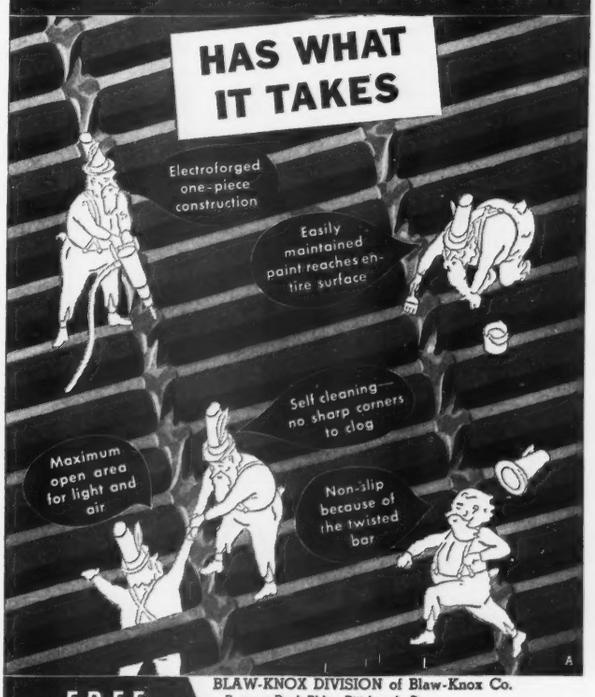
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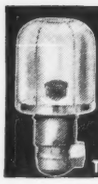

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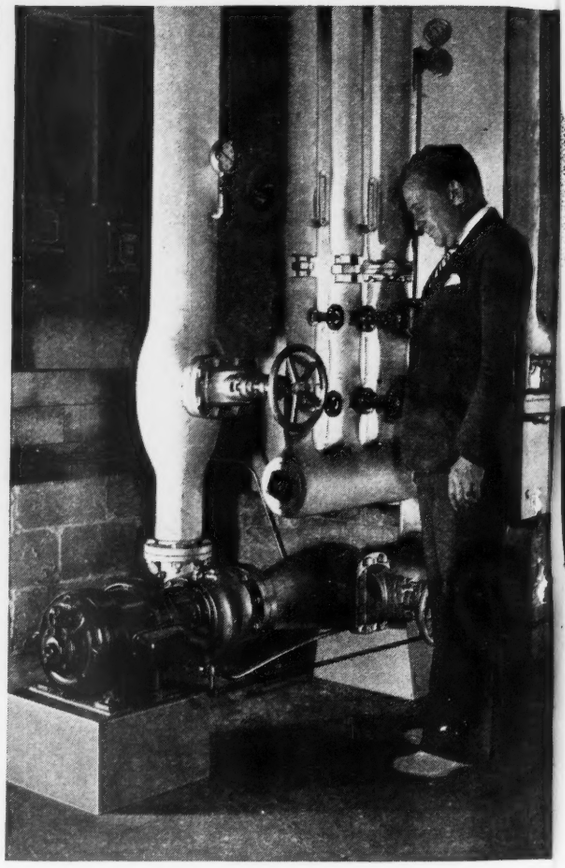

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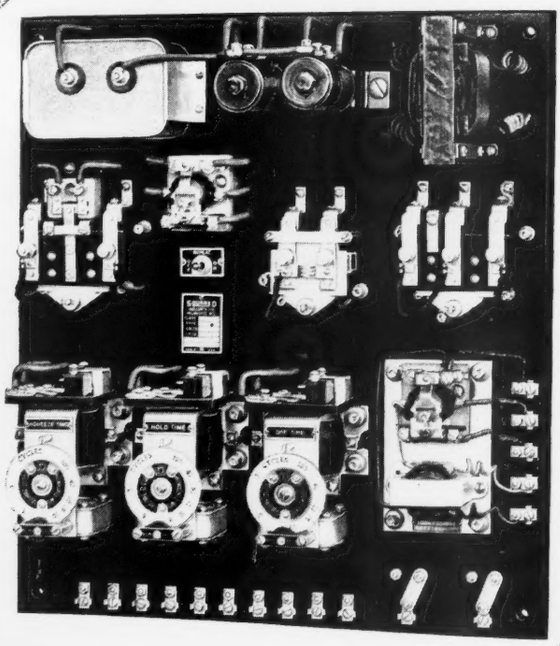

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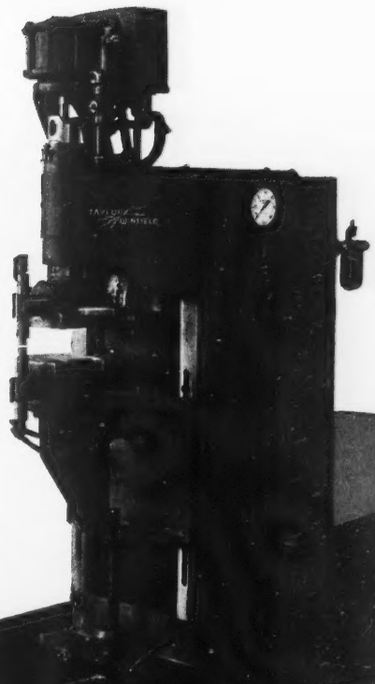

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2. After a predetermined interval to allow the pressure to build up, it energizes the timer of the current control.
3. When the weld is completed, it determines the period during which the electrodes maintain pressure after the current is cut off.
4. It controls the period when the electrodes are open before the operating cycle is repeated.

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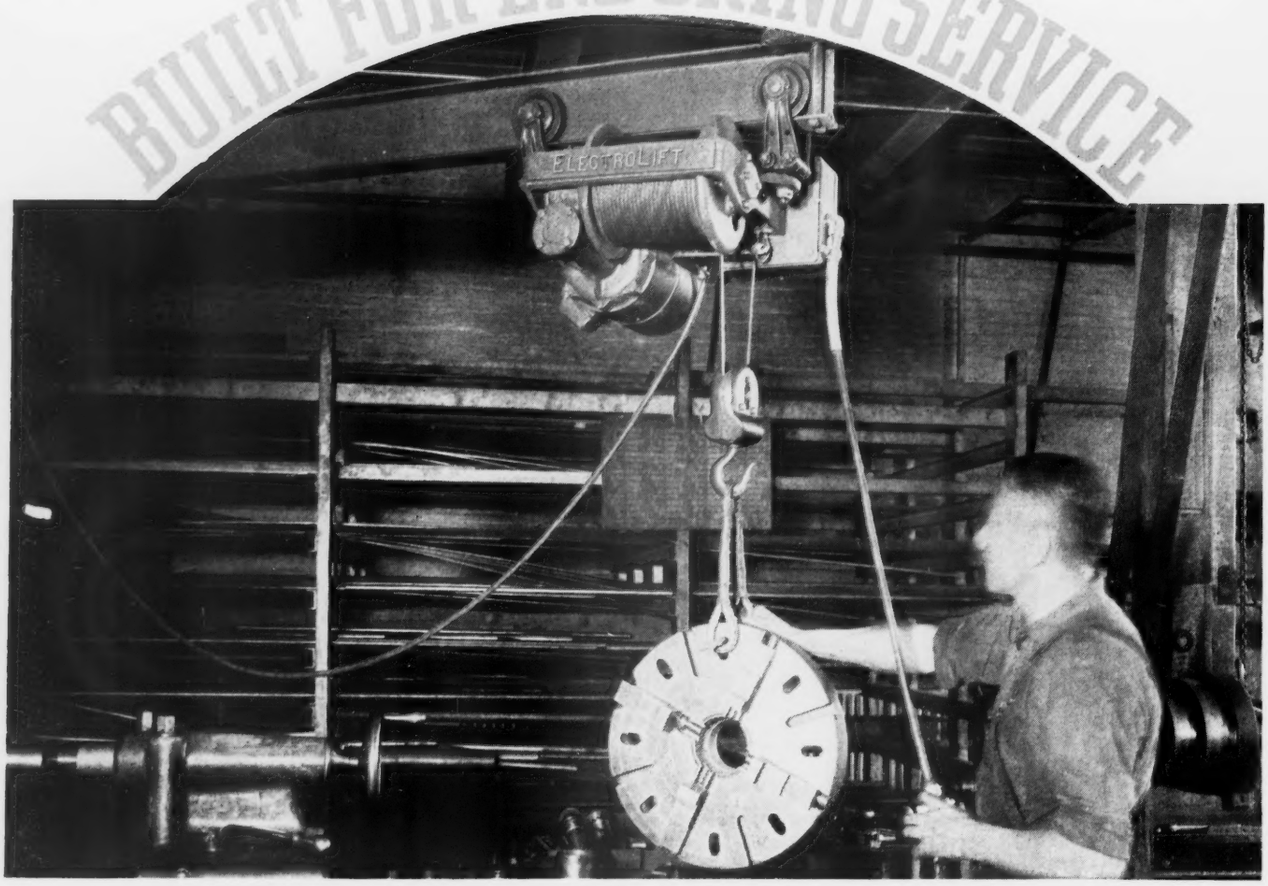

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